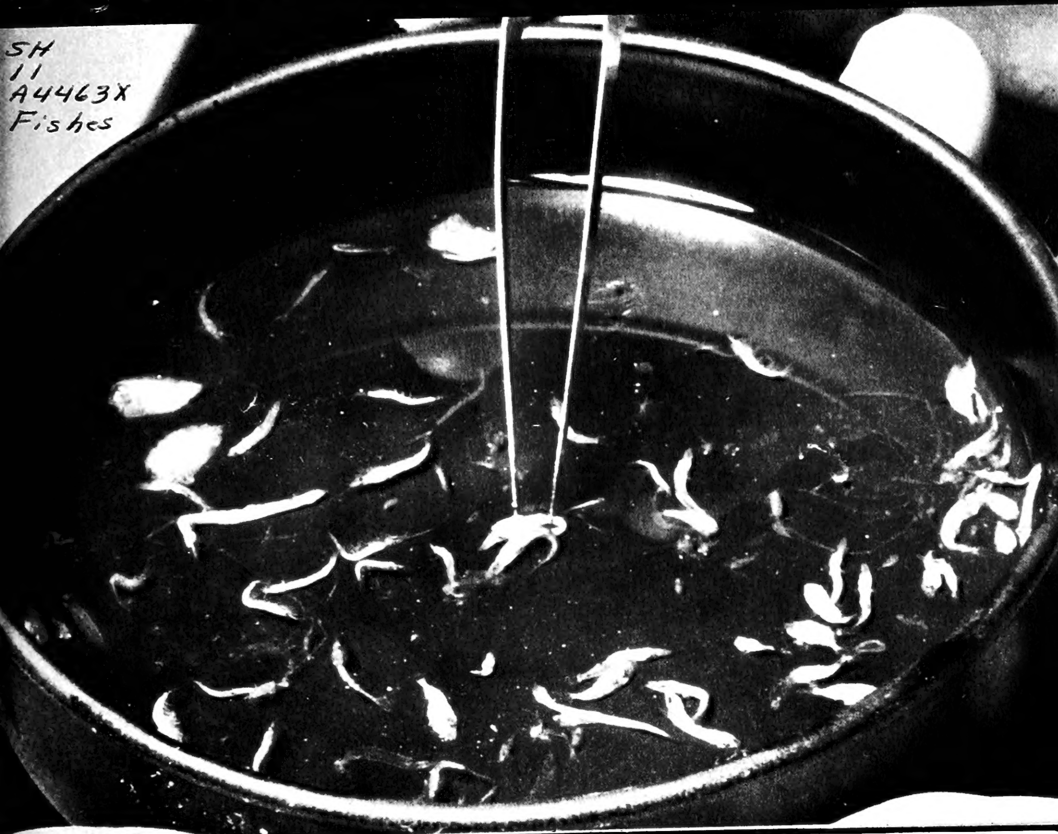
COMMERCIAL FISHERIES REVIEW



VOL. 26, NO. 11

NOVEMBER 1964

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

FISH AND WILDLIFE SERVICE
CLARENCE F. PAUTZKE, COMMISSIONER

BUREAU OF COMMERCIAL FISHERIES
DONALD L. MCKERNAN, DIRECTOR

DIVISION OF RESOURCE DEVELOPMENT
RALPH C. BAKER, ASST. DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
G. A. Albano and H. Beasley, Assistant Editors

Address correspondence and requests to the: Chief, Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

CONTENTS

COVER: Shows a larval swordfish being taken from a pan containing other larval fish including marlin, tuna, and barracuda. The specimens were taken in plankton tows by the research vessel John Elliott Pillsbury of the Institute of Marine Science, University of Miami, while conducting oceanographic investigations in the Tropical Atlantic between the northeast Bahamas and Bermuda. (Also see pp. 48-50 of this issue.)

Contents continued page II.

CONTENT (CONTINUED)

Contents continued page III.

CONTENT (CONTINUED)

Contents continued page IV.

CONTENT (CONTINUED)

Editorial Assistants: Ruth V. Keefe and Jean Zalevsky

Compositors: Alma Greene, Donna K. Wallace, and Marjorie McGlone

* * * * *

Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Cover and pp. 49 & 50 (fig. 4)--William M. Stephens, The Marine Laboratory, University of Miami; p. 16 (figs. 2 & 3)--U. S. Coast Guard; pp. 38 & 39--F. B. Sanford and C. F. Lee; p. 42--Exp. Fish & Gear Research Base, State Fish Pier, Gloucester, Mass.; p. 48--Don Heuer, The Marine Laboratory, University of Miami; pp. 61 & 62--Blount Marine Corp., Warren, R. I.; p. 74--Industrias Pesqueras Atlantico, Sur S.A.I.C., Buenos Aires, Argentina; pp. 77 & 78--Australian News & Information Bureau; p. 80--E. Estlander, FAO; p. 81--Robert O. Smith; pp. 83 & 84--Nordischer Maschinenban, Rud. Baader, Lubeck, Germany; p. 89 (right)--Arnie J. Suomela; p. 94--Consulate General of Japan, N.Y.; pp. 100-102--R. S. Croker; p. 106--M. Lindner; p. 111--A. C. Jensen, Woods Hole, Mass.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price 60 cents (single copy). Subscription Price: $6.50 a year; $2 additional for foreign mailing.

COMMERCIAL FISHERIES REVIEW

November 1964 Washington, D.C. Vol. 26, No. 11

PRELIMINARY REPORT ON EXPERIMENTAL SMOKING OF CHUB (LEUCICHTHYS SP.)

By Max Patashnik*, Charles F. Lee**, Harry L. Seagran***, and F. Bruce Sanford****

ABSTRACT

Owing to the recent problem created by bacterial contamination, the smoked fish industry of the Great Lakes faces the task of producing a marketable product under modified processing conditions. This article reports on the results obtained when chub was experimentally smoked under the processing requirements of the various State and Federal regulatory groups concerned. The results show that for industry to conform with those requirements, substantial changes will be necessary in its traditional processing methods.

INTRODUCTION

The smoked fish industry of the states surrounding the Great Lakes is of considerable local importance. Production of chub for smoking in 1962 and 1963, for example, was about 10 to 11 million pounds a year. In late 1963, however, bacterial contamination of smoked chub and whitefish resulted in the overnight collapse of that industry owing to the reactions of consumers and of regulatory groups.

The U. S. Food and Drug Administration, with the follow-up of several State regulatory agencies, published advisories specifying processing and storage conditions under which the industry would be permitted to resume production and distribution of smoked fish from the Great Lakes. Those advisories have raised the immediate question as to whether smoked chub processed and stored as specified by the various regulatory agencies would be an acceptable product. A preliminary investigation by a Bureau team of researchers showed that the industry lacked the answer to this question and that there was little if any reliable data on current processing techniques.

To assist the industry toward an ultimate solution of the botulism problem, the Bureau set up two main lines of research--one dealing with the microbiological aspects of the problem; the other with the technological aspects of processing. The microbiological work, which is being carried out under contract, will be reported separately. The present article is restricted to reporting on our preliminary investigation of processing. In presenting these results, the Bureau recognizes that the interim processing regulations of the various regulatory groups and herein evaluated are definitely preliminary. We must await results from the longer-range microbiological studies before a final regulatory code can be evolved.

The general objectives of the present investigation (January 20-February 20, 1964) were limited to the evaluation of process variables associated with the interim minimum requirements for the heat processing of smoked chub (180° F. for 30 minutes) as set forth by the

*Chemical Engineer, Technological Laboratory, Seattle, Wash.
**Chemical Engineer, Technological Laboratory, College Park, Md.
***Laboratory Director, Technological Laboratory, Ann Arbor, Mich.
****Chemist-in-Charge, Branch of Reports, Seattle, Wash.
} U. S. Bureau of Commercial Fisheries

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 712

Food and Drug Administration and as interpreted by the various State agencies. The three main objectives in the work being reported here were therefore:

I. To evaluate the heat process (180° F. for 30 minutes) specified in the interim regulations and to supply the technical information necessary to achieve that process.

II. To determine whether smoked chub heat processed as specified would be an acceptable product.

III. To evaluate some of the processing variables and raw-material variables in conjunction with the process specified by the new regulation.

EVALUATION OF INTERIM REGULATION HEAT PROCESS

In general, the smoking and processing practice of the industry is still an art, rather than a technologically controlled process. Most processors lack both the devices necessary to measure internal fish temperatures during smoking and the equipment necessary to control the smoking operation. Accordingly, data were needed for evaluating the feasibility of the process specified by the new regulation.

As the study of experimental smoking progressed, it became apparent that the industry needed information on the following:

1. Smokehouse heat-input requirements.

2. Measurement of internal temperature of chub.

3. Temperature differential between internal fish temperature and smokehouse temperature.

4. Total process time.

5. Smokehouse-temperature uniformity.

SMOKEHOUSE HEAT-INPUT REQUIREMENTS: Smokehouse heat-input requirements were studied to determine the additional input of heat needed to raise the internal fish temperature to the regulation process temperature of 180° F. in a reasonable time (say, 2 to 3 hours).

General Processing Procedure: In all the studies reported in this article, we employed essentially the same equipment, raw materials, and methods. The smokehouse used was a relatively simple, electrically heated smoker designed to smoke meat products in small

Fig. 1 - Hanging brined chub onto sticks.

Fig. 2 - Loading smokehouse.

plants. Owing, however, to the high B. t. u. heating demand for smoking of fish to 180° F. (because of short-time process with high-moisture-evaporative load), it was necessary to quadruple the heat input by the addition of a gas burner. To obtain more uniform distribution of heat and smoke, we added baffling within the smoking cabinet, a blower to obtain forced circulation inside the smokehouses, and a second blower to feed the maximum amount of smoke from an external smoke generator into the smokehouse. A multipoint recording potentiometer permitted continuous recording of temperatures. At least 10 thermocouples were employed during each run, generally 4 in the smokehouse and 6 or more embedded in the fish. The material consisted of frozen eviscerated chub. In most instances, the chub were thawed and prepared for brining and smoking in accordance with industry practice, and smoking and heat processing were carried on simultaneously. The control of humidity was not practical at the experimental temperatures used. (Note: Most of the industry smokehouses do not now employ humidity control.)

Product load and heat input were the variables in these preliminary experiments.

Findings: A large heat input far exceeding that generally available in Great Lakes commerical smokehouses is required to bring the internal fish temperature to 180° F. in 2-3 hours. A comparison of figures 3 and 4 shows the effect of increasing the heat input by 4 to 5 times for a fixed product load. The rapid heating shown in figure 2 was necessary to ensure an acceptable yield and to avoid overdrying the product.

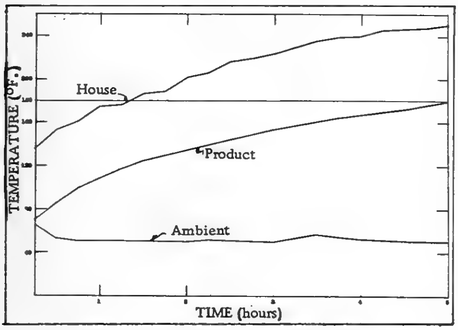


Fig. 3 - Increase of internal product temperature during smoking of chub. (Heat input: 350 B.t.u./cu. ft. hr.; product load: 50 lbs.)

In determining heating requirements, the processor must also take into account the product load. In figure 5, where the product load is approximately four times that in figure 4, the process is significantly lengthened.

TEMPERATURE MEASUREMENT: Temperature measurement was studied to determine the most reliable method for measuring the internal temperatures of chub during smoking.

Procedure: Initially, we measured internal fish temperatures by a thermocouple

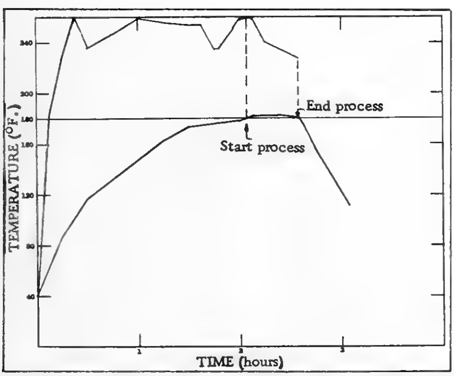


Fig. 4 - Increase of internal product temperature during smoking of chub. (Heat input: 1,600 B.t.u./cu. ft. hr.; product load: 50 lbs.)

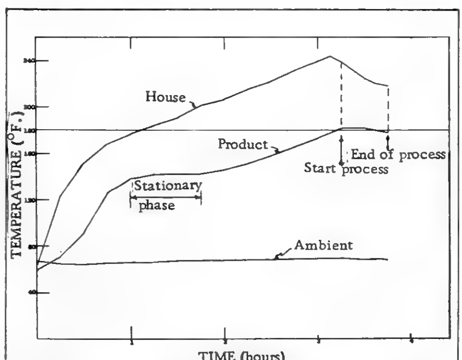


Fig. 5 - Increase of internal product temperature during smoking of chub. (Heat input: 1,300 B.t.u./cu.ft. hr.; product load: 220 lbs.)

inserted along the axial length of the fish in its thickest part (midway between its outer and inner surface). Experience demonstrated, however, that we obtained more accurate temperatures by bending the thermocouple (90 degrees) about one-half inch from its end (depending on the size of the fish), and inserting the thermocouple wire at right angles to the chub surface near the dorsal fin in the thickest part of the fish, securing the thermocouple wire to the fish by wrapping a few turns of string or preferably thin wire around both the fish and the thermocouple wire.

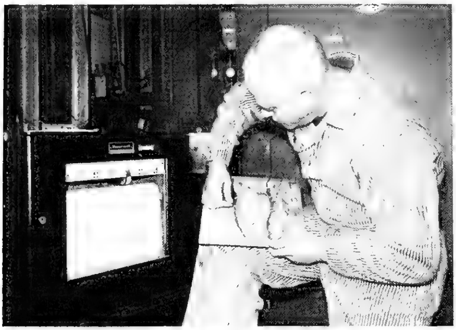


Fig. 6 - Securing thermocouple wire to chub.

Findings: Special "point-sensitive" temperature-measuring devices properly secured are necessary to give true internal fish temperatures, especially for small fish such as chub. The use of large temperature-sensitive bulbs give readings that differ markedly from the true internal fish temperatures (possibly up to 50° F. or higher).

DIFFERENTIAL BETWEEN INTERNAL FISH TEMPERATURE AND SMOKEHOUSE TEMPERATURE: We conducted the following experiment to determine the temperature differential needed to obtain a rapid continuous rise of the internal chub temperature to 180° F. Rapid temperature rise is important both to speed production and prevent excessive drying of the product.

Procedure: The temperature in the experimental smokehouse was raised generally to 240° to 250° F. in about 15 to 30 minutes, and the input of heat was then reduced to hold the temperature within that range. This method resulted in a steady and fairly rapid increase in the internal temperature of the fish. The fastest-heating fish (either because of size or location in the smokehouse) usually reached 180° F. in less than 1 hour, and the slowest, in about $1\frac{3}{4}$ hours, making the total run about $2\frac{1}{4}$ hours (predicated on holding the slowest-heating fish at 180° F. for 30 minutes). Because the smoke-generating equipment was inadequate, smoking usually was continued through the entire period of heating to obtain the maximum smoke flavor and desirable color. When the internal temperatures of the chub reached 180° F., smokehouse temperatures were slowly lowered to determine at what temperature differential the internal temperature of the fish begins to fall.

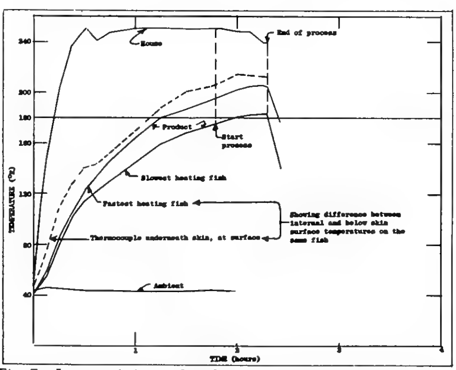


Fig. 7 - Increase in internal product temperature during smoking of chub. (Heat input: 1,600 B.t.u./cu.ft.hr.; product load: 40 lbs.)

Findings: This work brought out clearly that the temperature of the smokehouse differs greatly from the internal temperature of the chub (figs. 3, 4, 5, 7). Since fish is a relatively poor conductor of heat, a sufficiently large temperature differential must be maintained in order to drive the heat into the center of the fish in a reasonable time. If chub are to be processed in less than 3 hours, an initial overall temperature differential of at least 70° to 100° F. (of smokehouse over center of fish) is needed to attain the 180° F. process temperature as rapidly as possible. For maintaining the internal temperature of 180° F., the differential should not be less than 50° to 60° F.

(Note: This overall temperature differential, however, gives only part of the picture. Figure 7, for example, presents the spread

in internal temperatures between the fastest- and slowest-heating chub for a given run, as well as the temperatures underneath the skin for the fastest heating chub. Here the difference between the temperature at the center of the fish and the temperature underneath the skin represents the actual temperature differential driving heat toward the center. This temperature differential within the fish is substantially smaller than that between the smokehouse and the center of the fish, as is shown in figure 7. The temperature underneath the skin, in addition to being dependent on the smokehouse temperature, is also a function of the evaporation rate of moisture from the surface of the fish and therefore may vary greatly depending on such factors as air velocity and the moisture content of the air. Since this additional aspect complicates the picture, we have for simplification, considered the overall temperature differential--of smokehouse over fish--in our discussions, rather than the more variable and more difficult-to-measure temperature differential within the fish. Thus, each commercial processor employing steam or water-vapor injection and forced-air circulation should check the minimum temperature differential necessary to efficiently attain the regulation temperature of 180° F. for his specific installation.)

TOTAL PROCESS TIME: In the experiment on total process time, we studied the rate of loss of moisture and its effect on yield during a regulation process and also the effect on yield of air drying before and after processing. From the standpoint of cost and production, the total process time obviously should be as short as possible consistent with good quality and yield.

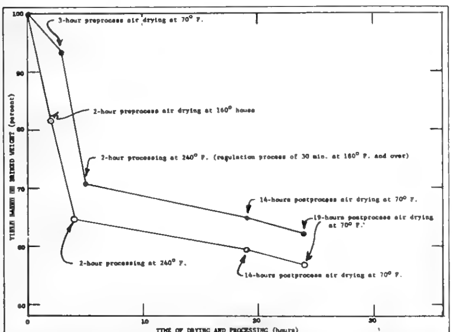


Fig. 8 - Decrease in percentage yield during processing and pre- and post process drying of chub.

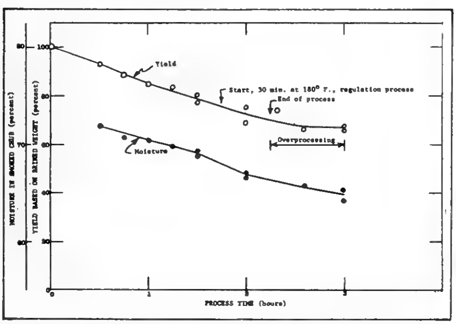


Fig. 9 - Decrease of percentage yield and moisture during regulation process and overprocessing of chub.

Procedure: The same processing procedure described under sections "Smokehouse Heat-Input Requirements" and "Differential Between Fish Temperature and Smokehouse Temperature" was followed. This general procedure was combined with pre- and post-process drying of chub.

Findings: Slow, prolonged processing as a result of inadequate heat input significantly

Fig. 10 - Weighing chub for yield studies.

reduced yield and undesirably dried the product. Predrying at low temperatures reduced final yield without accomplishing any useful purpose. For the required process temperature of 180° F., the optimum processing procedure would appear to be rapid heating with simultaneous smoking instead of smoking separately as has been industry practice in past low-temperature smoking operations. For highest yield, the total time that the chub is exposed to heat should be kept at a minimum. Figure 8 demonstrates that the loss of moisture takes place continuously before, during, and after processing. To avoid loss in yield, the operator should package the smoked product immediately after it has been chilled to storage temperature. Holding the chilled fish overnight before packaging may result in a 5- to 6-percent loss in yield. Figure 9 shows that the rates of loss in moisture and yield are fairly uniform throughout the regulation process.

SMOKEHOUSE-TEMPERATURE UNIFORMITY: Adequate forced-air circulation and good baffling in the smokehouse are essential in order to avoid undesirable hot and cold spots. Even-heat distribution is of concern to management from the standpoint both of processing regulations and of product uniformity and yield.

Grading for size in order to provide a uniformly processed product accordingly merits consideration.

PRODUCT ACCEPTABILITY

In ascertaining the acceptability of the product, we were principally concerned about the effect of the current regulation thermal-process requirements in relation to the following three variables:

1. Heat processing and smoking before packaging.

2. Heat processing after smoking and packaging.

3. Simultaneous smoking and heat processing after packaging.

HEAT PROCESSING AND SMOKING BEFORE PACKAGING: Since all states in the Great Lakes area interpreted the requirement of 180° F. for 30 minutes to apply to heating and smoking chub before rather than after packaging, the next experiment evaluated smoked chub processed according to those regulations.

Procedure: The same general procedure previously described was employed.

Findings: Processing chub at 180° F. for 30 minutes before packaging is feasible (on the basis of resultant yield and quality), although this temperature probably cannot be attained at the center of the fish with the equipment currently used in industry. Chub processed for an hour at center-of-fish temperatures of 180° to 200° F. were not excessively dry or overcooked. Processing mixed sizes of fish may present a problem, however, for the smaller fish will be overprocessed and the yield thus reduced. The decrease of yield caused by loss of moisture during regulation processing and overprocessing of chub is shown in figure 9.

Fig. 11 - Quality evaluation of chub after smoking.

HEAT PROCESSING AFTER SMOKING AND PACKAGING: To date the decision as to whether regulation heat processing (180° F. for 30 minutes) is to be carried out before or after smoking and packaging the product has not been agreed upon by all regulating agencies. Since our earlier experiment dealt with

the effect on quality of heat processing before packaging, the next experiment determined the effect on quality of regulation heat processing after packaging. We investigated the effect on quality of processing at higher temperatures--204° F., which presumably is adequate to destroy Clostridium botulinum Type E within about 10 minutes (a short-time-high-temperature pasteurization process, slightly more effective than the 180° F. for 30-minute process); and 245° F., which is adequate to destroy Types E, A, and B within about the same time (a sterilization process).

Procedure: Two separate sets of smoked samples in flexible film (vacuum) and in aluminum foil were rapidly steam-retorted at retort temperatures of about 250° to 255° F., which were reduced as necessary to hold internal fish temperatures at about 204° F. or 245° F. for the time intervals required to achieve either the estimated partial or complete sterilization.

Findings: Sterilization after smoking adversely affected the smoked flavor, producing an inferior product. In partially steam-sterilizing individual smoked chub inside the package (in aluminum foil, and in flexible film with vacuum) for about 10 minutes at an internal temperature of 204° F. (F_o = .02,[1] which is estimated to be adequate to destroy Clostridium botulinum Type E), we found not only that the texture and smoked flavor changed significantly, though not seriously, but that any rancidity initially present in the frozen chub stock was accentuated. When individual smoked chub were fully steam-sterilized inside the package for 11 to 12 minutes at about 245° F. internal temperature (F_o = 6 plus, adequate to destroy Types E, A, and B Clostridia), the texture and smoked flavor were seriously affected.

SIMULTANEOUS SMOKING AND HEAT PROCESSING AFTER PACKAGING: We simultaneously conducted both the smoking and heating process after the product had been packaged. Potentially, this type of processing--if practical--could eliminate the hazard of bacterial contamination of the product during the period between smoking and packaging.

Procedure: In a cooperative processing experiment with industry, one group of chub, each enclosed in cellulose casings, was heat processed and smoked simultaneously. (The cellulose casing permitted the vapor phase of the smoke to penetrate the material and impart color, flavor, and odor to the product during heat processing. This technique thus theoretically permitted the product to be smoked while in the package.) A second group of unpackaged chub similarly treated acted as controls.

Findings: Only where the cellulose casing was in immediate contact with the fish did smoke, flavor, and color penetrate well. Upon removal, the casing tended to stick to the skin of the fish. Moisture collected in pockets formed by the casing, although fluid could be decreased during processing by making a small opening at the bottom of the casing. Comparisons between control and cellulose encased fish indicated that the latter retained more moisture and salt.

This method could possibly be an answer to processing smoked fish at 180° F. for 30 minutes and protecting the product from bacterial recontamination after smoking provided that the quality and higher cost problems can be resolved.

EVALUATION OF PROCESSING VARIABLES

Several process variables subject to control by the processor were evaluated for their effect on yield, quality, and composition of smoked chub, all within the framework of the regulation process (180° F. for 30 minutes). These included:

1. Raw material.

2. Brining.

3. Acid treatment.

1/ F_o serves as a commercial standard whereby the sterilizing effect of different processes may be compared under standardized conditions.

RAW MATERIAL: We studied the effect of variability in initial quality, size, and composition of the chub on the ultimate quality and yield of the smoked product prepared in accordance with the regulation process.

Procedure: Three lots of chub of significantly different initial freshness were regulation smoked. The first lot consisted of eviscerated chubs, mostly No. 2 or medium, bulk-frozen in 50-pound blocks with an ice glaze. This lot was to have been typical of commercial frozen stock. Its quality, however, was highly variable, and much of it was very poor. The second lot, which was frozen unglazed in plastic bags holding about 40 pounds, again consisted of eviscerated chubs taken by a commercial vessel. These fish were more uniform in size and of somewhat better quality. The third lot was caught by a U. S. Bureau of Commercial Fisheries exploratory vessel and frozen in plastic bags in 5-pound lots. Some bags held mostly large fish (three to the pound), and others held small; all were superior in quality to the other two lots. The general processing was similar to that used in earlier experiments.

Samples of the raw fish before and after brining and of fish after smoking, were analyzed for moisture, oil, and salt (chlorides).

Findings: The raw and the smoked chub varied widely in both composition and quality. Even fish of uniform size varied in composition, but the large fish usually had relatively more oil. In general, size, quality, and the composition of the fish all affected the absorption of salt and the other changes in the product that occurred during smoking.

The oil content of the smoked chub depended not only upon fish size (large fish were 2 to 3 percent higher in oil) but also on the extent of their drying during smoking. The percentage increase in oil content caused by drying was partly counteracted, however, by loss of oil by drip. The oil content of all samples was usually in the range of 7 to 15 percent. Moisture content depended to some degree on the extent of brining, but mainly on the drying caused by the thermal process and by the preprocess and postprocess handling. As expected, larger fish gave higher yields than smaller fish. This fact again emphasizes the importance of close grading for size before smoking.

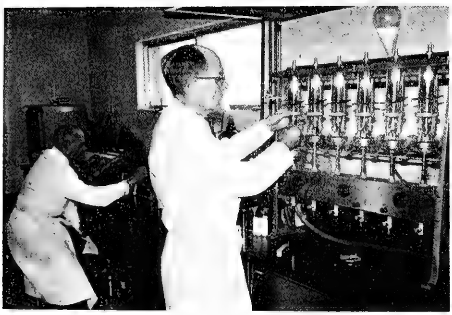


Fig. 12 - Oil-extraction apparatus.

When the heat input was sufficient to enable the processing to be completed within $2\frac{1}{2}$ hours, the yield of smoked product was 68 to 73 percent of the brined weight. Slow heating, overprocessing, or air drying, either before or after smoking, reduced the yield to about 55 to 65 percent.

Chub of initially poor quality or those that subsequently became poor in quality while in frozen storage gave a less desirable smoked product and lower yields. Oxidative rancidity was clearly apparent immediately after smoking in the more poorly preserved frozen chub.

BRINING: We studied the effect of various brining conditions on the ultimate quality and yield of the smoked product in relation to the regulation process.

Procedure: Some lots of chub were brined overnight in 20° to 30° salinometer brine in accordance with industry practice. Other lots were placed in stronger brines (50° and 70° salinometer) for 1 or 2 hours. Another lot, involving 11 sublots, was brined in concentrations ranging from 0 to 100° salinometer (saturated). All lots were given the regulation process.

Findings: On the basis of taste-panel tests, 2 to 3 percent salt in the smoked product appeared to be the acceptable range for most consumers. Smoked products in this salt range

Fig. 13 - Taste-panel evaluation of chub for salt level and quality.

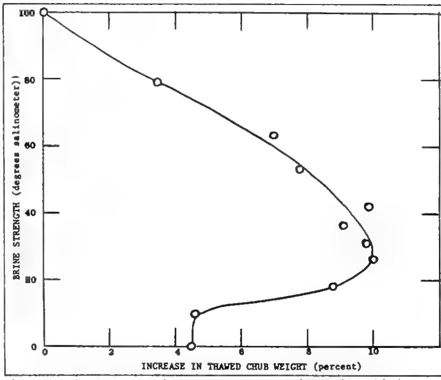


Fig. 14 - Percentage change in thawed chub weight with increasing strength of brining solution (18-hour brining time).

required a salt content of about 1 to 2 percent before being smoked. Brining chub overnight (16 to 18 hours) in 20° to 25° salinometer brine or for 2 hours in 40° to 50° salinometer brine usually resulted in a satisfactory level of salt in the smoked product.

In the test using 11 brine concentrations, the fish gained weight in all lots but the one involving saturated brine. As expected, the uptake of salt during brining depended largely on the concentration of brine and duration of brining. The maximum increase of 10 percent in chub weight occurred in brines of 25° and 30° salinometer (fig. 7). Figure 15 shows the percentage increase of salt content in brined and smoked chub with increasing strength of brining solution.

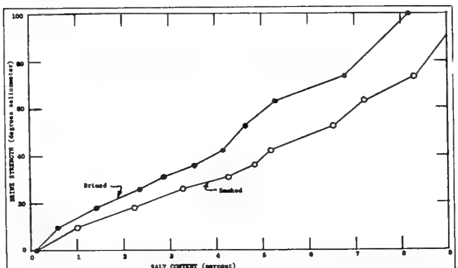


Fig. 15 - Increase in salt concentration in the brined and smoked product with increasing strength of brining solution (18-hour brining time).

ACID TREATMENT: We studied the feasibility of increasing the acidity of the meat of smoked fish to a pH at least 4.0 by an acid pretreatment as a means of inhibiting Clostridium botulinum growth (Type E toxin has been demonstrated, however, in pickled herring of pH 4.0 to 4.2 at 23° C., Dolman, Chang, Kerr, and Shearer, 1950; and Dolman and Iida, 1963.) We recognized that the buffered nature of the fish tissues would present difficulty in lowering the pH of the product. To answer several requests from industry for such data, however, and to estimate the resulting effect on the quality of the product, we carried out experiments with several acids that are sometimes used in food products.

Procedure: The following acid-brine treatments were tried: 10-percent acetic acid for 1 hour, 5-percent acetic acid for 18 hours, 2-percent phosphoric acid for 2 hours, 5-percent lactic acid for 16 hours, and 2-percent lactic acid for 16 hours. Controls were run with each set of acid-treated fish.

Findings: When the acidity of the smoked fish product was increased significantly by employing acetic, phosphoric, or lactic acids during the brining operation, the quality was impaired. Texture and flavor acceptability decreased markedly as did also the yield. Increasing the acidity by decreasing the pH of the smoked product to 4.0 or lower therefore appears to be impractical.

CONCLUSIONS

I. Meeting the interim-regulation heat process (180° F. for 30 minutes) will require considerable modification of current commercial processing equipment and practices.

   A. Rapid heating is necessary to ensure good yield and to avoid excessive drying of product.

   B. Special point-sensitive temperature measuring devices (thermocouples) are necessary to give true internal temperatures for small fish such as chub. Large temperature-sensitive bulbs give false readings.

   C. If rapid heating of product is to be achieved (process time of less than 3 hours), an initial temperature differential (of smokehouse over fish) of at least 70° to 100° F. is needed.

   D. For optimum yield, the total process time (from presmoking through packaging) should be held to a minimum consistent with quality. The product therefore should be smoked, cooled, and packaged rapidly.

   E. Forced-air circulation and baffling in the smokehouse are essential in order to ensure uniformity of smokehouse temperature and thus minimize hot and cold spots.

II. From the standpoint of yield and quality, smoked chub heat processed as specified by the various State regulatory agencies (180° F. for 30 minutes outside the package) is an acceptable product. Smoking of chub after packaging, or pasteurization or sterilization reprocessing of presmoked chub after packaging, however, yields an inferior product.

III. Variables such as the oil content and size and quality of the raw fish affect the concentration of brine and brining time needed. These process variables do not conflict, however, with the regulation process as such--that is, each variable must be considered separately.

   A. Chub vary widely in size, composition, and quality. These variables all affect salt uptake during brining and product behavior during smoking.

   B. Two to 3 percent salt in the smoked product appears to be an acceptable range for most consumers.

   C. Decreasing the pH of smoked fish to 4.0 or lower appears to be impractical from the standpoint of product quality.

FUTURE CONSIDERATIONS

Although the current interim regulations adopted by State regulatory groups are feasible from the standpoint of quality and yield and probably will give greater protection to the product than before, the actual degree of microbiological safety for a product mishandled during distribution (for example, held at a storage temperature higher than recommended) is at present unknown.

We anticipate that the Bureau's microbiological contract work will shed light on this aspect of the problem. Several different ways of attacking it are being tried simultaneously. Results of the Bureau's efforts in this field will be disseminated as rapidly as each phase of the work is completed.

LITERATURE CITED

DOLMAN, C. E.; H. CHANG; D. E. KERR; AND A. R. SHEARER
1950. Fish-Borne and Type E Botulism: Two Cases Due to Home-Pickled Herring. Canada Journal of Public Health, vol. 41, pp. 215-229.

DOLMAN, C. E., AND H. IIDA
1963. Type E Botulism: Its Epidemiology, Prevention, and Specific Treatment. Canada Journal of Public Health, vol. 54, p. 29.

BACK ISSUES AVAILABLE

Copies of back issues of Commercial Fisheries Review for the years and months as indicated below are available upon request by writing to: Fishery Market News Service, U.S. Bureau of Commercial Fisheries, 1815 N. Fort Myer Dr., Arlington, Va. 22209. Requests will be filled on a first-come first-served basis until the supply is exhausted.

1956	1957	1958	1959	1960	1962	1963
Jan.	Jan.	Jan.	Nov.	June	May	Jan.
Apr.	Apr.	Feb.	Dec.	July	June	Feb.
Dec.	Aug.	Mar.		Aug.	Aug.	Mar.
	Sept.	May		Sept.	Oct.	May
	Oct.	June			Nov.	June
	Nov.	July			Dec.	July
	Dec.	Dec.				Aug.
						Sept.
						Oct.
						Nov.
						Dec.

Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.

AGE COMPOSITION OF THE COMMERCIAL CALIFORNIA BLUEFIN TUNA CATCH IN 1963

By Peter A. Isaacson*

ABSTRACT

Over 30 million pounds of bluefin tuna were landed at California ports in 1963, making it the third largest season in 46 years. The fishery was dependent on fish of age groups I, II, and III which comprised 89 percent by weight and 97 percent by numbers of the catch. Age group II was the largest age group by weight comprising 43 percent of the total quantity.

Good correlation was found between the means of age groups I, II, and III and length-frequency modes, strongly supporting the theory that checkmarks on scales are of annular origin.

INTRODUCTION

Between the years 1918 and 1963 the California commercial landings of bluefin tuna (Thunnus thynnus) have varied from about 0.5 million pounds in 1933 to over 31 million pounds in 1962. During the past 10 years bluefin tuna has placed among the top 10 commercial species in value and pounds landed. The past season, 30,400,087 pounds of bluefin tuna were landed at California ports, making 1963 the third largest season in 46 years.

Annual bluefin age and growth parameters are necessary before population dynamics can be investigated. Due to the constantly increasing demand for fish as a source of food and a source of certain manufacturing industries, and because of the danger that even the apparently limitless stocks of the oceans might be depleted by the continuous removal of its resources, the dynamics of the population from which our commercial fishery draws its catch must be understood before realistic management judgments are possible. To aid in determination of maximum sustainable yield of the eastern Pacific bluefin stock, data was collected from the 1963 commercial bluefin landings at Terminal Island, Calif., on both age and length frequency so that an estimation of the age composition of the catch could be made.

Table 1 - Calculated Percentage of Fish Landed Both by Number and by Weight for Age Groups 0 Through VI for the 1963 Season Year-Class Are Also Indicated

Age Group	0	I	II	III	IV	V	VI
Year-Class. . . .	1963	1962	1961	1960	1959	1958	1957
Percentage Catch By Number. . .	0.29	47.30	40.27	10.02	1.45	0.48	0.19
Percentage Catch By Weight . . .	0.11	25.11	43.75	20.26	6.27	2.96	1.54

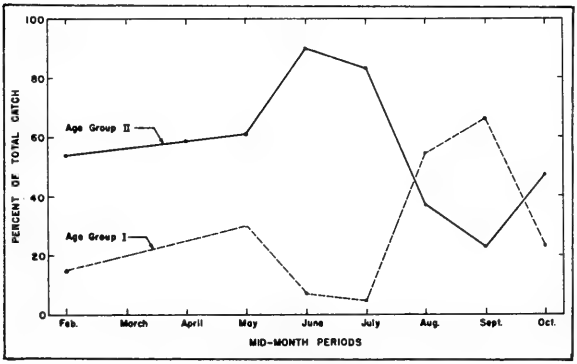


Fig. 1 - Shift in the dominant age group by numbers from age group II to age group I.

MATERIAL AND METHODS

The absolute age determination of tuna is difficult and the results obtained from some investigations are problematic. The scale technique as used by Bell on the albacore, Thunnus alalunga, (1962) and bluefin tuna (1963) was sufficiently encouraging to justify the use of his methods.

*Marine Biologist, Marine Resources Operations, Department of Fish and Game, Menlo Park, Calif.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 713

Scale samples and length-frequency data were collected throughout the 1963 season. Length-frequency samples were collected randomly and consisted of 50 fish from each vessel in port. At times, conditions arose when all vessels could not be sampled; however, a concerted effort was made to sample as many vessels as possible. The fish were measured, to the nearest centimeter, from the tip of the upper jaw to the fork of the tail. A sample of approximately 50 scales was obtained from every fifth fish in the length-frequency sample for use in age determinations. Scales were taken from either the caudal peduncle or from an area below the second dorsal fin.

Bluefin scales are difficult to read and cleaning and staining the scales helped to distinguish the checkmarks (Bell 1963). Eleven percent (132) of the 1,170 scale samples were unreadable due to oil impregnation, regeneration, or other imperfections.

RESULTS

Of the 1,038 scale samples read, only 24 were from age groups 0, IV, V, and VI. Over 89 percent of the weight of the fish caught in 1963 consisted of age groups I, II, and III, with age group II contributing 43 percent of the quantity. Over 97 percent of the catch by number consisted of the same age groups with age group I the dominant age group (table 1.)

Table 2 - Ages of 1,038 Bluefin Tuna Caught in the Commercial Fishery in the 1963 Season

Age Group	0	I	II	III	IV	V	VI
Number.	3	491	418	104	14	5	2
Mean Length (cm.)	57.7	64.3	83.5	102.9	136.0	155.0	170.5
Standard Deviation	1.53	2.55	8.68	6.47	11.13	2.92	3.54
Standard Error of Mean.	0.89	0.15	0.42	0.63	2.87	1.30	2.50
Range.	56-59	54-88	60-109	71-135	120-155	151-158	168-173

From mid-July through mid-September there was a shift in the dominant age group by numbers from age group II to age group I (fig. 1). Ninety percent of the landings of age group I were made in those two months and contributed over 60 percent of the total catch by numbers.

The good correlation found between the means of age groups I, II, and III and length-frequency modes strongly support the theory that checkmarks on scales are of annular origin. Small samples sizes for age groups 0, IV, V, and VI gave inconclusive comparisons (table 2, fig. 2).

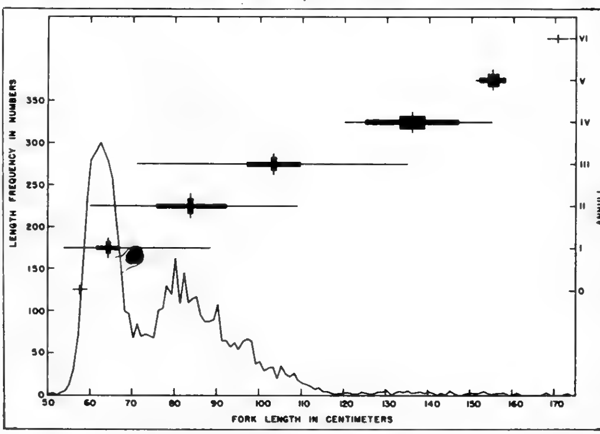


Fig. 2 - Age and length frequency relationship of sampled bluefin tuna. The fine line represents the range; the long solid box, one standard deviation on either side of the mean; and the short box, one standard error of the mean on either side of the mean.

SUMMARY

The 30.4 million pounds of bluefin tuna landed in California made 1963 the third largest season in 46 years. The fishery was dependant on fish of age groups I, II, and III which comprised 89 percent by weight and 97 percent by numbers of the catch. Age group II was the largest age group by weight comprising 43 percent of the total quantity.

A second movement of bluefin into our fishing area may be indicated by a shift in dominant year-classes by number in the later part of the fishery.

Only 11 percent of the 1,170 scale samples collected were unreadable for various reasons and the good correlation between length-frequency modes and means of age groups I, II, and III strongly indicate that checkmarks on the scale are of annular origin.

LITERATURE CITED

BELL, ROBERT R.

1962. Age Determination of the Pacific Albacore of the California Coast. California Fish and Game, vol. 48, no. 1, pp. 39-47.

1963. Preliminary Age Determination of Bluefin Tuna, Thunnus thynnus. California Fish and Game, vol. 49, no. 4, p. 307.

TODAY SMALL FISH USED TO MAKE LOW-COST MARINE OILS

If the fish aren't biting it costs the paint and varnish industry more than usual to manufacture its products.

What's the connection? It's a boney fish too oily to eat, weighing less than a pound, measuring less than a foot--the menhaden, the principal source in the United States of the marine oils used as drying agents in paints and varnishes.

Marine oils mixed with raw linseed oil are used in exterior house paints. They're used also in barn and roof paints, rust-proof coatings, and undercoat paints. In varnish, bodied fish oil is combined with tung oil, a use that will probably increase because the cost of fish oil is well under that of tung oil.

Marine oils, along with the fish meal that's produced at the same time, are used on a much smaller scale in livestock and poultry feeds and other products.

While marine oils account for less than 3 percent of the United States output of fats and oils, they are low-cost competitors of such farm-derived products as soybean, linseed, castor, tung, and tall oils.

Now that vitamins A and D are produced synthetically, another type of marine oil popular 30 years ago--the medicinal oil such as cod-liver oil--has all but vanished.

Last year menhaden accounted for 90 percent of all marine oil produced in the United States. But the menhaden, which mostly swim along the Atlantic and Gulf coasts, weren't around to be netted by commercial fishing fleets in the usual numbers last year.

As a result, marine oil production dropped sharply from a high of 266 million pounds in 1961 to 186 million pounds in 1963.

Marine oil prices rose accordingly, from 4 cents a pound (Baltimore) in January 1963 to 8.5 cents in April 1964. In August 1964 the price of menhaden oil had risen to 8.75-9.25 a pound.

At 4 to 5 cents a pound, fish oil is one of the lowest-priced oils on world markets. While manufacturers like the quality finish the marine oils give paint and varnish, it's basically price that gives fish a competitive edge over soybean, linseed, and other drying oils, both at home and abroad.

The United States is a net exporter of marine oils, selling menhaden and buying whale sperm oil which is used as a lubricant in fine precision instruments.

This favorable export position is relatively new. Up until 1950 we were a net importer. (The Farm Index, U. S. Department of Agriculture, August 1964.)

TRENDS AND DEVELOPMENTS

Alaska

HANDLING AND PROCESSING ABOARD JAPANESE VESSELS OF ALASKA SALMON: Two of the Japanese vessels in Prince William Sound, which processed fresh salmon purchased from Alaska fishermen this past summer, were visited in August 1964 by an observer from the U. S. Bureau of Commercial Fisheries. He was accompanied by the representative of a Japanese international combine who was serving as coordinator for the Japanese fishing firms involved in the salmon purchase. Processing aboard the Japanese factoryships was said to be similar in all cases. The Japanese vessels visited were the stern-ramp freezer trawlers Ibuki Maru and Daishin Maru No. 15. A description of the processing aboard those vessels follows:

Normally, Japanese workmen board the fishing boat and place the fish into a brail with a purse-string closure in the center. No salmon are accepted that are badly watermarked or that have been pewed through the body. Those men handle the fish with gloved hands. When the brail is loaded, it is lifted aboard the processing vessel, and the fish are released on an elevated sorting table. Here the salmon are inspected, segregated by species, and placed in a sheet-metal chute leading to the processing deck below.

Processing aboard is very simple, with all salmon frozen in the round. The fish are thoroughly washed with soft brushes and salt-water sprays (no tanks or dips and no water used twice). Pink salmon are placed in stainless steel freezer pans with removable bottoms that hold about 10 kilograms (22 pounds). The pans hold 6 to 10 pink salmon placed in a single layer side by side, head to tail to head. A similar freezer pan somewhat larger--perhaps 15 kilos (33 pounds)--is used for larger fish.

Small chum salmon are hand-packed like the pink salmon. Larger chum salmon are placed on a sheet of plastic packaging material, sprayed with an antioxidant, and frozen individually.

After being packed, the fish are conveyed to the freezing compartment. The Japanese vessels are equipped with at least 12 hydraulically-operated pressure plate freezers each with a capacity of about 1 ton. In addition, they usually have a blast freezer to handle individual fish and other nonuniform jobs. The freezing cycle is 4 to 6 hours depending on the load and other fish waiting to be processed.

After they are frozen, the fish are conveyed through a glazing machine where temperature is controlled to release the fish from the pans. The pans are removed, and the block is glazed in a second glazing machine before being packed in corrugated cartons for storage in the hold. Handling is assisted by conveyer systems or salt-water flumes, and there is a minimum of hand labor.

According to information from Japanese sources, the pink salmon will be canned in Japan, and the chum salmon sold on the fresh market. The canned salmon will then be exported, probably to the United Kingdom. No fish cutting was observed aboard the vessels visited.

* * * * *

FOREIGN FISHING ACTIVITIES OFF ALASKA:

U. S. S. R.: Soviet trawling activity in the Gulf of Alaska was gradually reduced through August 1964. By month's end about 30 trawlers accompanied by various types of support vessels were operating alternately on Albatross and Portlock Banks off Kodiak Island. Soviet activity in the Gulf during 1964 has been considerably less than in 1963. It was believed this was due to expanding saury and herring fishing activities off the Siberian

Fig. 1 - Type of Soviet trawler operating in North Pacific and Bering Sea.

coast and Sea of Okhotsk rather than to any lessening of fishing success in waters off Alaska.

Soviet whaling activity shifted into the Bering Sea during August, with one fleet operating east of the Pribilof Islands, a second fleet fishing generally south and west of that island group, and a third hunting along the Aleutian Chain. It was believed that 1964 was the first year the Soviets have commercially exploited the whale resources of the eastern Bering Sea.

Japan: Two Japanese king crab factoryships, the *Tokei Maru* and *Tainichi Maru*, accompanied by 12 catcher vessels fished along the north side of the Alaska Peninsula from the vicinity of Unimak Pass to the Port Moller area during August.

Fig. 2 - Sorting and weighing crab meat prior to freezing aboard a Japanese king crab factoryship.

One shrimp factoryship (*Einin Maru*) accompanied by 12 trawlers continued to fish north of the Pribilof Islands group. The second shrimp factoryship, the *Chichibu Maru*, was believed en route to resume fishing for shrimp in that same area after transferring the salmon purchased in Prince William Sound to the vessel *Haruna Maru* on the high seas.

Two Japanese fish meal factoryships accompanied by an undetermined number of trawlers returned to the eastern Bering Sea after an absence of several weeks. It was believed they later shifted operations west to the Siberian coast (between Cape Navarin and Cape Oliutorskii) through most of August.

Fig. 3 - Type of Japanese trawler operating in the Bering Sea.

It was believed that Japanese whaling operations were terminated in August and that those fleets might be en route to Japan.

Two small Japanese side trawlers and 4 stern trawlers were reported fishing for shrimp and Pacific ocean perch on Albatross Bank off Kodiak during August 1964.

* * * * *

KODIAK HAS EXCELLENT SALMON SEASON:

Kodiak Island had what appeared to be the best pink salmon year in recent history. The weekly closures on salmon fishing there this year (1964) have been primarily to give the rushed canneries an opportunity to keep pace. But a pessimistic note at Kodiak during August was the presence of large king crab vessels with no market for their catch. One shore plant was processing crabs on a part-time basis. Only two other processors were then operating--one at Port Wakefield and the other at Jap Bay.

It was believed there would be at least five king crab plants in operation in Kodiak by late fall. Another plant was operating in Raspberry Straits, just a few minutes flying time from Kodiak.

* * * * *

KODIAK PROCESSING PLANT VERY ACTIVE:

A Kodiak cold-storage and processing plant (temporarily put out of commission by

the March 27 earthquake) was reported to have bounced back stronger than ever. This past August there were about 60 people working in the Dungeness crab-processing section of the plant which was started about a year ago. The crabs being processed were large--3-5 pounds, and they were plentiful. The product is prepared in several different ways, ranging from picked meat put up in 5-pound cans to individual selected crabs which are ice-glazed and frozen whole after being dipped in a special formula of brine. Those whole crabs reach the market without being cleaned, but the bright red shells have been scrubbed to a polished sheen. In addition to Dungeness crab, a king crab-processing line has just been set up in another section of the Kodiak plant. That other section is operated by a different firm and employs about 35 people. On the main floor, salmon and halibut are cleaned and frozen during the season. Daily landings of halibut at the plant at the end of July were near 600,000 to 700,000 pounds. The cold-storage section of the plant employs about 45 persons.

* * * * *

GOOD PROGRESS IN HERRING REDUCTION: Herring reduction plants at Big Port Walter and Washington Bay were having a good production season this past summer. At Big Port Walter the pumping system of unloading fish is being replaced this year with a "marine leg" bucket elevator, which was used a few years earlier. The reason for the reversion is to slow down unloading equipment and to decrease loss of oil. By the end of August 1964, 88,000 barrels of herring were processed at Big Port Walter, with the oil yield exceeding 5.5 gallons per barrel.

* * * * *

AMPLE SUPPLIES FOR CRAB-PROCESSING PLANTS: As of August 1964 there were three shore-processing plants and two floating plants processing crabs in the Shumagin Islands and Alaska Peninsula areas. Crab catches in those areas were excellent and adequate to keep the plants operating on a full-time basis.

* * * * *

CORDOVA DUNGENESS CRAB PRICES DROP: Dungeness crab fishermen in Cordova were faced with a drop in price from 14 cents to 12 cents a pound for whole crab on August 15. The price decline was attributed to market demand. The only Dungeness crab packer on the Sound also said fishermen would be placed on a limit because the plant was unable to keep up with the catch.

* * * * *

FILING OF FISHERY DISASTER LOAN APPLICATIONS EXTENDED TO OCTOBER 31, 1964: Extension of the time for acceptance of fishery disaster loans to October 31, 1964, was announced by the Regional Director for the U. S. Bureau of Commercial Fisheries in Alaska, on September 25. The Secretary of the Interior authorized the extension of the time for acceptance of fishery loan applications to be handled as disaster loan applications from September 30, 1964, to October 31, 1964. Disaster loans through the U. S. Bureau of Commercial Fisheries provide financial assistance to fishermen who need to replace or repair commercial fishing vessels or fishing gear that was lost, damaged, or destroyed during the March 27, 1964, earthquake or subsequent tidal waves.

Note: See Commercial Fisheries Review, October 1964 p. 13.

Alaska Fisheries Explorations and Gear Development

SHRIMP EXPLORATIONS OFF ALASKA: M/V "Paragon" Cruise 64-2 (June 16-September 19, 1964): Exploratory fishing for shrimp and other shellfish (scallops) in the Gulf of Alaska and Bering Sea was the principal objective of this 13-week cruise by the U. S. Bureau of Commercial Fisheries chartered exploratory fishing vessel *Paragon*.

A total of 308 stations in the area of operations was covered during this cruise. Emphasis was oriented toward completion of uniform seasonal summer shrimp explorations for the northern portion of the Gulf of Alaska from Cape St. Elias westward to the Aleutian Islands. During three summer seasons, beginning in 1962, over 500 exploratory shrimp trawl drags were completed in that area by fishing vessels chartered by the U. S. Bureau of Commercial Fisheries. Secondary objectives of the *Paragon's* cruise included preliminary shrimp explorations in selected areas of the eastern Bering Sea and recon-

naissance for indications of scallops in waters adjacent to Kodiak and the Alaska Peninsula.

The primary sampling gear used were 40-foot flat and semiballoon shrimp trawls and an 8-foot New England style scallop dredge.

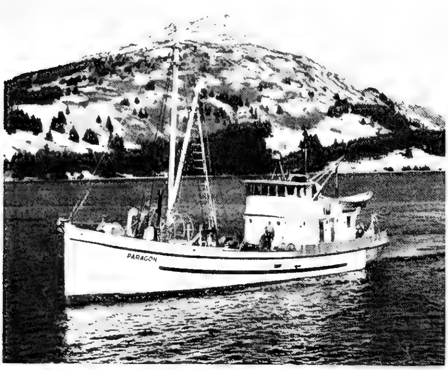


Fig. 1 - Chartered exploratory fishing vessel Paragon.

To facilitate cruise organization and comparative evaluation, the area fished during Paragon's Cruise 64-2 was divided into 5 geographic entities--Area D, consisting of the waters off the northern end of Kodiak Island and Marmot Bay; Area E, the southern portion of Shelikof Strait and waters adjacent to the Alaska Peninsula west to Sutwik Island; Area F, west of the preceding to Unimak Island (including the Shumagin Islands); Area G, Sanak Island west to Unalaska Island including Unimak Pass; and Area H, selected portions of the Bering Sea and Bristol Bay.

The abundance of shrimp in the vicinity of the Shumagin Islands (Area F), indicated by earlier Bureau explorations in 1957, was positively substantiated during this cruise. The average catch rate for 82 thirty-minute trawl drags in that area was over 650 pounds. Individual catches of over 1,000 pounds of shrimp were common. Of particular note was the fact that those catches included significant quantities of the desirable side-stripe shrimp

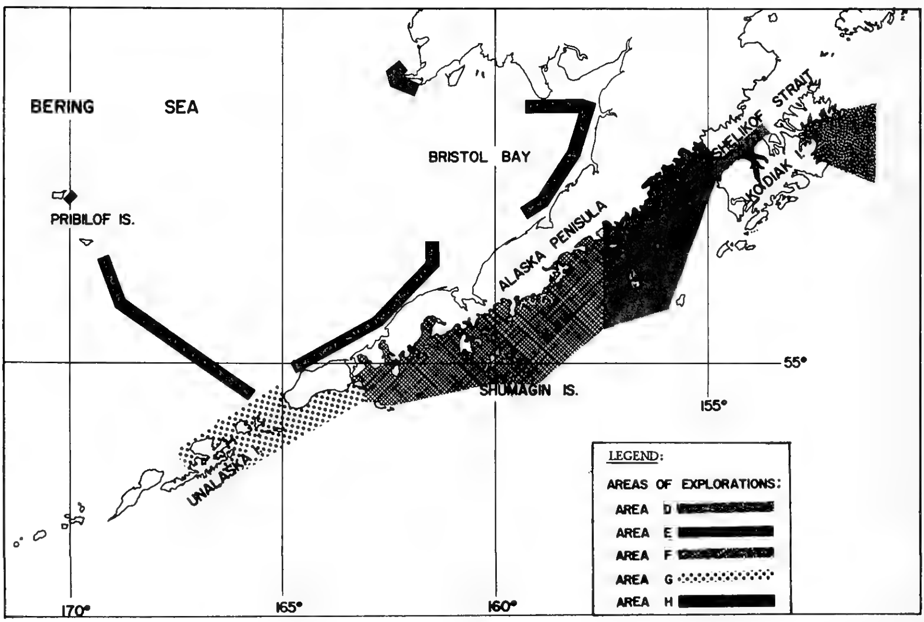


Fig. 2 - Shows division into geographic areas of Paragon Cruise 64-2, June 16-September 19, 1964.

Summary of Catch Data for Shrimp Taken on the M/V *Paragon* Alaska Exploratory Cruise 64-2						
Shrimp Species		Average Catch of Shrimp Per Trawl Drag				
		Area (no. of shrimp trawl drags taking shrimp)				
Common Name	Scientific Name	D(29)	E(14)	F(82)	G(48)	H(59)
		(Lbs.)				
Pink shrimp	*Pandalus borealis*	58.4	20.0	479.7	75.8	5.3
Side-stripe	*Pandalopsis dispar*	121.3	37.3	119.6	17.8	0.4
Humpy	*Pandalus goniurus*	.2	-	35.1	-	-
Coon-stripe	*Pandalus hypsinotus*	.9	.4	18.9	1.4	-
Total.		180.8	57.7	653.3	95.0	5.7

(*Pandalopsis dispar*) which averaged in size about 26 whole shrimp to the pound. This species was also well represented in Marmot Bay (Area D).

In the overall survey, pink shrimp (*Pandalus borealis*) was the dominant species, accounting for almost 70 percent of the total shrimp taken. Other species caught, but in relatively small quantities, included "humpy" (*Pandalus goniurus*) and coon-stripe (*Pandalus hypsinotus*).

Reconnaissance for scallops was carried out at locations where local knowledge of scallop (*Patinopecten caurinus*) occurrence had been indicated. Sixty-seven sampling drags were made with an 8-foot wide scallop dredge. From that total, 28 of the drags caught scallops in quantities ranging from 1 to 250 per 30-minute drag. The best catch was from near Marmot Island and consisted of about 250 six-inch scallops. Only six drags took more than one bushel of scallops. The results of those limited scallop explorations do not provide evidence of commercial concentrations in the areas sampled.

In addition to data on shrimp and scallop abundance, records were kept throughout the cruise of other shellfish and fish caught. For example, data such as the size and number of halibut (*Hippoglossus stenolepis*) taken during trawl drags were recorded. One 30-minute shrimp trawl drag made in inner Bristol Bay yielded 252 juvenile halibut which indicates that location is included in an important nursery area.

Note: See *Commercial Fisheries Review*, August 1964 p. 14.

Alaska Fishery Investigations

COPPER RIVER SOCKEYE SALMON SEROLOGICAL SAMPLING:

The Branch of River Basin Studies, U.S. Bureau of Sport Fisheries and Wildlife, in Western Alaska has completed its 1964 collection of Copper River sockeye salmon blood samples for serological analysis at the Seattle Biological Laboratory. Samples were taken from 406 fish in the commercial fishery at the Copper River Delta and from 991 fish on the spawning ground of the upper and lower Copper River.

An attempt was to be made this year (1964), on the basis of serological analysis, to separate fish in the commercial fishery into races that have been already identified on the spawning grounds.

* * * * *

NAKNEK SYSTEM RED SALMON SMOLT OUTMIGRATION:

An estimated 7.2 million red salmon smolt were reported to have left the Naknek Lake system in 1964. Thus, the 1964 outmigration was considerably smaller than the peak outmigration of 16.8 million estimated in 1962.

About 69 percent of the 1964 migrants were 3-year-olds from the 1961 brood year, while the remainder of the smolts were 2-year-olds from the 1962 brood year. From 1956 to 1961, 2-year-old smolt made up the largest part of the yearly outmigrations. However, since 1962, the outmigrants have mainly been 3-year-olds, with the 1964 smolt run having the greatest percentage of 3-year-olds on record.

* * * * *

KARLUK LAKE SALMON ESCAPEMENT:

Adult escapement of sockeye salmon to Karluk Lake through August 20, 1964, numbered 225,512 fish or somewhat below the

1961-63 average of 264,000 by that date. Also, 219 king salmon and 28,275 pink salmon had passed the weir up to that date. A substantial pink salmon run appeared to be developing at that time.

* * * * *

CRAB TAGGING PROGRAM: Although bad weather hampered vessel operations during late August, more than 4,000 crabs were tagged. Tagged crabs were released in offshore areas on Albatross Bank, near Chirikof Islanu, and west of Chirikof Gully near the Semidi Islands. Returns from those releases should give important information on the geographical boundaries of several stocks of crabs.

* * * * *

OLSEN BAY PINK SALMON RUN, 1964: The early pink salmon run this past season, which was smaller than in recent years, entered Olsen Creek by August 10, and the late run was beginning to enter the stream by August 20. Chum spawning (totaling about 5,000 fish) was virtually completed by the end of August.

Prior to the Alaska earthquake this past March, 95 percent of chum spawning and 75 percent of pink spawning occurred in the Olsen Creek intertidal zone. This year only 25 percent of the chums utilized the intertidal area, and through August only 35 percent of the pinks. Chums spawned this year in the new intertidal zone between present tidal elevations of 7.5 and 10.5 feet. That elevated area corresponds with the pre-earthquake lower intertidal zone (elevation 2.5 to 5.5 feet), and was never before occupied by chum salmon. Pink salmon are also spawning in the 7.5- to 10.5-foot section; they have used that area before (when it was 2.5 to 5.5 feet), but only in years when spawners were much more abundant than this year.

Mortality of eggs deposited in the pre-earthquake 2.5- to 5.5-foot zone was nearly 100 percent in former years. That high mortality was probably due to a high percentage of fine material in the streambed, and to extreme changes of temperature, salinity, and dissolved oxygen accompanying tidal cycles.

Because of elevation of the spawning area by the earthquake, the lethal effects of tide on the pre-earthquake 2.5- to 5.5-foot zone have now largely been eliminated. The principal remaining limiting factor is excessive fine materials in the streambed gravels. Therefore, survival of eggs in the present 7.5- to 10.5-foot level will depend mainly on how rapidly salmon spawning and stream action will remove the fine materials to permit adequate intragravel water circulation. Assessment of survival in the fall of 1964 and again next spring by egg pumping will give the answers.

* * * * *

TRANSPLANTING LIVE PINK SALMON: At Kuiv Island this past August, from 3,000 to 4,000 live pink salmon were seined and placed in circulating sea water tanks aboard a fishing firm's tender. The fish were caught in Bear Harbor, Affleck Canal, and arrived at Little Port Walter in good condition after a 7-hour trip. They were released into a large floating pen in the bay and held for later release in Sashin Creek above the weir. Mortality during capture and transit was less than 5 percent. Observations of the distribution of the transplanted fish in Sashin Creek were to be made, and survival of their progeny will be measured in order to study this method as a transplanting tool.

* * * * *

STUDIES ON MIGRATIONS OF JUVENILE SALMON: The M/V Heron accompanied by the reconnaissance-catcher vessel Blue Boat completed Early Sea Life of Salmon cruises 3 (July 27-August 5) and 4 (August 17-24) in major channels of Southeastern Alaska and on the outer coasts of Chichagof and Prince of Wales Islands. Those cruises were part of a series to trace seaward migrations of juvenile salmon as they move through summer nursery areas to the Gulf of Alaska. The cruises were highly successful because ideal weather conditions prevailed for observations and fishing. Round haul seine catches from the Blue Boat ranged from several hundred to several thousand per set.

American Fisheries Advisory Committee

FISHERIES PROBLEMS TO BE DISCUSSED AT 18TH ANNUAL MEETING:

Testing and tasting of irradiated fishery products was to be one of the highlights of the 18th annual meeting of the American Fisheries Advisory Committee scheduled to be held at Beverly, Mass., October 5-7, 1964, announced the Regional Director, North Atlantic Region, U. S. Bureau of Commercial Fisheries, on October 1.

During its 18th meeting, the Advisory Committee will review national and international problems confronting the United States commercial fishing industry and also review research and other programs of the Department of the Interior's Bureau of Commercial Fisheries. Because of the Massachusetts meeting site, special attention will be given to fishery developments in the New England area.

The American Fisheries Advisory Committee, comprised of individuals actively engaged in the commercial fishing industry, advises the Secretary of the Interior on matters pertaining to the commercial fishing industry. It was formed in 1955 under provisions of the Saltonstall-Kennedy Act, which makes funds available to the Department of the Interior for research on domestically-produced fishery products and other programs. Frank P. Briggs, Interior's Assistant Secretary for Fish and Wildlife is the permanent chairman of the committee.

The committee meets once or twice a year depending on circumstances. Its last meeting (17th annual meeting) was at Honolulu, Hawaii, in January 1964. That meeting emphasized oceanographic research and other matters pertaining to the commercial fisheries of Hawaii and the Central Pacific.

In addition to Assistant Secretary Briggs, other Department of the Interior representatives to attend the meeting included Thomas D. Rice, Special Assistant to the Commissioner for Fish and Wildlife, and Donald L. McKernan, Director, Bureau of Commercial Fisheries.

Note: See Commercial Fisheries Review, March 1964 p. 9.

American Samoa

AMERICAN SAMOAN-BASED TUNA FLEET DWINDLING:

The number of tuna vessels operating out of American Samoa is progressively decreasing. In mid-August 1964, there were 35 tuna vessels working out of that base, compared with around 100 vessels in 1963 during peak periods. Of those 35 vessels, 22 are Japanese, 9 Korean, 3 Formosan, and 1 Okinawan. In September, the number of Samoan-based vessels was expected to be further reduced to around 30, due to additional withdrawals contemplated by Japanese vessel owners.

The high cost of vessel operations is said to be one of the major problems for Japanese vessel owners operating out of American Samoa. Fuel, which they have to purchase through the United States packers located on Samoa, is said to cost 50 percent more than in Japan. Another problem troubling Japanese vessel owners is the increasing demand for better working conditions being made by crew members serving on vessels under 100 gross tons, which have poor accommodations.

Those problems are compelling owners of vessels under 100 gross tons to withdraw operations from the Samoan base, and it appears that the base, which Japan originally developed to aid her small and medium tuna vessel owners, is being taken over by the Koreans and Formosans.

The reduction of fleet operations in the South Pacific Ocean is said to have increased the catch rate. The catch rate for albacore is reported to have more than doubled, from 50-60 fish average per long line in 1963 to 120-130 fish in 1964. However, the fish are smaller this year, averaging 33 pounds as compared with 39.6-48.4 pounds in 1963. Japanese fishery circles are primarily attributing the higher catch rate attained this year to the absence of heavy fleet concentrations on the fishing grounds and not to the recovery of resources. (Suisan Keizai Shimbun, August 23, 1964.)

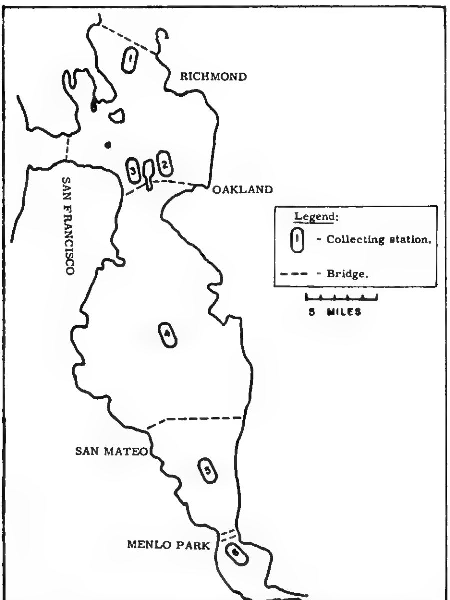
California

SAN FRANCISCO BAY INVESTIGATIONS CONTINUED:

M/V "Nautilus" Cruises 64-N3a-b-c-d-e S. F. Bay Study (February 19-21, 1964, March

14-18, April 21-24, May 16-20, June 16-20): To collect fish species and invertebrates routinely at six stations to: (1) determine their distribution and relative abundance under prevailing environmental conditions, (2) define ecological zones of San Francisco Bay, and (3) determine the food organisms of principal fish species and their availability were the objectives of this series of cruises by the California Department of Fish and Game research vessel Nautilus.

The six stations worked in the Bay study area (San Francisco Bay south of San Pablo Bay) had an average depth ranging from 20 to 50 feet, with the location of each station as follows: (Station 1) - $\frac{1}{4}$ mile south of Redrock; (Station 2) - $\frac{1}{2}$ mile east of northeast corner of Treasure Island; (Station 3) - $\frac{1}{4}$ mile west of northwest corner of Treasure Island; (Station 4) - $\frac{1}{4}$ mile east of radar pylon at north end of San Bruno Shoal; (Station 5) - $\frac{1}{2}$ mile north of No. 2 buoy at entrance to Redwood City Harbor midway between the centers of the San Mateo and Dumbarton bridges; and (Station 6) - $\frac{1}{2}$ mile east of the Dumbarton railroad bridge.



Shows collecting stations during San Francisco Bay study by the Nautilus.

Operations during this cruise included catching surface fish with a midwater trawl 25 feet on a side. This net was towed routinely for 20 minutes, but in May and June most stations were also covered by a second 20-minute tow to check adequacy of the sample. Night tows were made at stations 1, 2, and 3. Replication of tows and night drags indicated the basic 20-minute unit was collecting adequate samples.

On the February and March cruises, bottom collections were made with a 10-foot beam trawl dragged for 20 minutes, or with two 10-minute tows where debris became a problem. On the April, May, and June cruises, the bottom was sampled with a 15-foot wide otter trawl as it caught more fish per tow than the beam trawl, and picked up less trash.

Plankton tows lasting 20 minutes with a $\frac{1}{2}$-meter net were made at all stations and the material was preserved for later analysis.

Several dozen shiner perch were collected during the April cruise for bioassays. Ten live white croakers were collected for fish-sound communication studies, and some fish were also collected for the Steinhart Aquarium at San Francisco.

Surface and bottom water temperatures and salinities were taken at stations 1 through 5 but at station 6, which was shallow, surface samples only were taken.

During the first 6 months of 1964, 52 species of fish were taken bringing the total to 62 species for the San Francisco Bay study as of midsummer 1964. Five of the fish species were not taken during 1963. Those not taken were: bonehead sculpin (Artedius notospilotus) at stations 1 and 3; padded sculpin (Artedius fenestralis) at station 1; diamond turbot (Hypsopsetta guttulata) at stations 1, 2, 4, and 5; river lamprey (Lampetra fluviatilis) at station 5; and greenling sea trout (Hexagrammos decagrammus) at station 3.

Surface water temperatures ranged from 11.1° to 18.6° C. (52.0° to 65.4° F.) as compared with 11.9° to 21.1° C. (53.4° to 70.0° F.) for the same period in 1963. Strong winds are the temperature-controlling factor most of the time. Salinities were higher at all stations in 1964 due to less rainfall. The range was from 23.3 to 31.9‰ compared with 16.5 to 29.8‰ for the same period in 1963.

Note: See Commercial Fisheries Review, April 1964 p. 11; December 1963 p. 20; September 1963 p. 15.

* * * * *

ABALONE OBSERVATIONS AND GROWTH STUDIES:

M/V "Nautilus" and M/V "Mollusk" Cruises 64-N-5A and 64-M-1A-Abalone (June 29-July 13, 1964): The objectives of these cruises by the California Department of Fish and Game research vessels Nautilus and Mollusk in the coastal area from Cambria to Pt. Estero were to: (1) delineate a study area for abalone; (2) sample red abalone randomly for numbers, sizes, sex ratios, and maturity; (3) make habitat and predation observations; and (4) tag abalone for growth studies.

During this cruise, coordinates within the area of operations were plotted and charted by the vessel Nautilus using radar, depth finder, and visible reference points.

Because of poor weather conditions, charting was delayed and diving was so curtailed that underwater observations were made on only one day. Kelp appeared heavier than usual for the time of year. Considerable new shell growth at their margins was observed on abalone measuring 3 to 4 inches, but recent growth had occurred with all sizes sampled during the cruise.

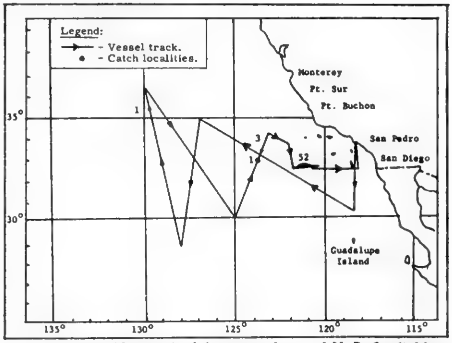
Note: See Commercial Fisheries Review, November 1963 p. 24.

* * * * *

ALBACORE TUNA MIGRATION STUDIES AND TAGGING:

M/V "N. B. Scofield" Cruise 64-S-3-Albacore (May 25-June 23, 1964): The objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield were to: (1) intercept the albacore tuna migration and determine its route into the mainland fishing grounds; (2) collect physical and biological data which may be related to albacore occurrence; and (3) tag and release albacore. The area of operations was on the high seas off California and northern Baja California, out to 600 miles offshore between the latitudes of Guadalupe Island and Monterey (latitudes 29°00' to 36°30' N. and to longitude 130°00' W.).

During this cruise, some 3,100 miles were scouted during daylight hours and surface trolling gear was used. A total of 57 albacore tuna were caught, with the first taken in 59.9° F. water on June 9, about 540 miles west of Pt. Buchon. Four more albacore (average 11 pounds) were caught June 18 about 360 miles west of San Diego in 59°



Cruise (64-S-3-Albacore) of the research vessel N. B. Scofield to study migrations and collect biological data related to albacore tuna.

to 60° F. water and the remainder (average 14 pounds) were taken June 20-22, about 20 to 30 miles south of San Juan Seamount.

Stomachs from 52 of the specimens were either empty or contained such food items as squid, sauries, and larval fish. Trematodes and copepods were collected from the stomachs and gill chambers. Most of the fish were 2 years old, although a 1-year old fish was taken along with 6 that were 3 years old.

Sea temperatures were obtained at regular intervals by bucket thermometer, while the thermograph provided a continuous record. The temperatures ranged from 57.4° F. northwest of San Juan Seamount to 68.4° F. at the most southerly point of the cruise west of Guadalupe Island.

A total of 78 bathythermograph (BT) casts to 450 feet were made at about 40-mile intervals; a water sample, for salinity determination, and the temperature was obtained at 10 meters by a Nansen bottle cast at each BT station; and weather observations were recorded every six hours.

Eleven night-light stations were occupied on this cruise while the vessel drifted on sea anchor. Pacific sauries (Cololabis saira) ranging from 4 or 5 individuals to schools of several hundred were observed at every station. A juvenile jack mackerel (Trachurus symmetricus), several species of lanternfish (myctophids), and several kinds of larval fish were also taken. The more common invertebrates collected included coelenterates, amphipods, heteropods, tunicates, and salps. A

total of 58 adult jack mackerel and four immature blue shark (*Prionace glauca*) were caught on hook and line.

The most commonly sighted bird on this cruise was the black-footed albatross (*Diomedea nigripes*). An osprey (*Pandion haliaetus carolinensis*) was seen on May 30 about 300 miles southwest of Point Sur, Calif. Other birds observed were Beal's Petrel (*Oceanodroma leucorhoa*), red-billed tropic bird (*Phaethon aethereus*), and the common tern (*Sterno hirundo hirundo*). Several porpoise schools were also observed, and Japanese glass floats were recovered in various areas.

During the cruise, 5 albacore ranging from 62 to 71 centimeters (24.4 to 28.0 inches) were marked with FT-1 dart tags and released.

Note: See *Commercial Fisheries Review*, September 1963 p. 20.

* * * * *

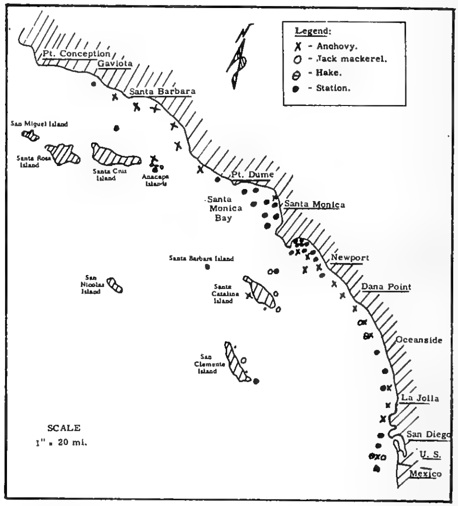
PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 64-A04 Pelagic Fish (June 2-21, 1964): The purpose of this cruise by the California Department of Fish and Game research vessel *Alaska* in the coastal waters of southern California (including the offshore islands) from Gaviota to San Diego was to: (1) survey the pelagic environment off southern California; (2) assess the density, age and size composition of pelagic species; (3) collect northern anchovy (*Engraulis mordax*) samples for blood genetic and electrophoretic studies; and (4) take underwater pictures and make observations of the midwater trawl in action.

The midwater trawl, blanket net, and visual scouting were the tools used in this survey. A total of 35 trawl and 21 night-light stations were occupied and 73 miles of ocean were scouted at night between stations. The Precision Depth Recorder was used during each tow and was quite effective in locating schools of fish and fish scattered near the surface.

Photomoter readings, made at most stations, varied from 0 to 99 with most of the readings in the 80's. The zero reading was caused by a heavy "red tide bloom" in Santa Monica Bay.

The only fish sighted during scouting were eight Pacific bonito (*Sarda chiliensis*) schools.



Pelagic fish population survey by the *Alaska* Cruise 64-AO4 (June 2-21, 1964).

During most of the cruise there was very little phosphorescence in the water, a prerequisite to effective night scouting for fish schools.

Anchovies were the most abundant fish species caught. Other fish taken, in their order of abundance, were: jack mackerel (*Trachurus symmetricus*), Pacific hake (*Merluccius productus*), queenfish (*Seriphus politus*), midshipman (*Porichthys* sp.), Pacific pompano (*Palometa simillima*), and small quantities of 19 other species.

Invertebrates caught on this cruise included salps (*Salpa tilesiicostata*), squid, and euphausiids (*Euphasia* sp.). Salps were very abundant and complicated trawling by clogging net meshes. In Santa Monica Bay they were so abundant that further trawling operations there were cancelled.

A total of 18 tows was made after dark and 17 during daylight hours (normal working hours were from 1800 to 0200, sunset was about 2030 Pacific Daylight Time). All night tows were successful in catching some species of fish while only 10 of the daylight tows were successful. Only 9 of 21 night-light stations were successful.

ANCHOVIES: Anchovies were found throughout the survey area with the exception of San

Clemente Island. In the Port Hueneme-Santa Barbara area, large schools were noted on the fathometer and anchovies were caught in all but 2 tows. In general, fish in that area, were not large (about 115 millimeters, or 4.5 inches standard length).

The area from Los Angeles to San Diego did not contain any large schools (none were seen on the depth recorder or surface) but fish were scattered near the surface. Deep tows gave poor results while all surface tows were very successful. This same observation was made in the fall of 1963 during a similar pelagic fish cruise. Fish caught were larger than those in the more northerly portion of the survey area with many exceeding 130 millimeters (5.1 inches) and showing more advanced gonad development.

Samples were taken for electrophoretic studies, primarily from areas not fished by the live-bait fleet.

JACK MACKEREL: Most of the jack mackerel taken on this cruise were caught near the offshore islands by midwater trawl. Offshore samples were dominated by the 1963 year-class whereas inshore catches were all small young-of-the-year. Night tows took 95 percent of the catch.

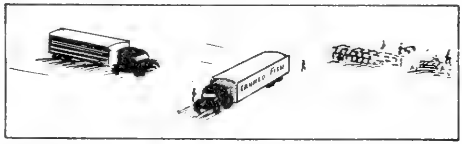
PACIFIC HAKE: Tows made around the offshore islands and between Oceanside and San Diego took 227 hake ranging in size from 54 to 470 millimeters (2.1 to 18.5 inches) standard length. The majority were small, young-of-the-year.

One day of the cruise was spent with the Department of California Fish and Game divers making underwater observations of the midwater trawl in action. Several tows were made at various speeds and depths while the divers crawled about the net. It was noted that parts of the net were taut while other areas were slack. The divers' observations will be very valuable in redesigning the research vessel's old nets and designing new ones. No underwater pictures were taken because of adverse water conditions. Several days of cruise time was lost on this trip because of poor weather and an engine breakdown.

Note: See Commercial Fisheries Review, October 1964 p. 15; December 1963 p. 17.

Cans--Shipments for Fishery Products, January-July 1964

A total of 1,586,934 base boxes of steel and aluminum was consumed to make cans shipped



to fish and shellfish canning plants in January-July 1964, a decrease of 10 percent from the 1,762,839 base boxes used during the same period in 1963. The decline is due partially to a drop in the canning of jack mackerel and Maine sardines.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans in 1964 are derived by use of the factor 23.5 base boxes per short ton of steel. (In the years 1962 and 1963, tonnage data were based on the factor 21.8 base boxes per short ton of steel.) The use of aluminum cans for packing fishery products is small.

Central Pacific Fisheries Investigations

SWIMMING BEHAVIOR OF TUNA AND MACKEREL STUDIED:

Tuna and mackerel never stop swimming in their open ocean environment. This continuous swimming by those species is being studied in experimental tanks at the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu. Swimming is associated in varying degrees with food-seeking, gill ventilation, and depth maintenance.

In the absence of food stimuli, wavyback skipjack (Euthynnus yaito Kishinouye) which have been held in the Laboratory's shoreside tanks for a month usually swim at a uniform slow speed (0.75 meters per second or 2.4 feet per second for a 0.42-meter or 1.3-foot fork-length fish) throughout the day and night. If deprived of food for several days, their swimming speed decreases to 0.55 meters or 1.8 feet per second but increases after a meal. Since other animals, such as mice, become more active when deprived of food for several days, it appears that the slow continuous speed of tuna is not controlled by the food drive. Further evidence of this is that tuna continue to swim at night although feeding is confined to the daylight hours.

When tuna are alerted to the presence of food they swim rapidly if they have not eaten recently. When food odor is introduced into the tank, wavyback skipjack which had not been fed for 2 to 5 hours increase their speed to 1.5 meters or 4.8 feet a second; those not fed for 15 hours or more increase their speed to 1.8 meters or 5.8 feet a second. At sea this behavior characteristic of tuna may increase the probability of their contacting food outside of visual range which they have sensed by chemical means.

Tuna must swim continuously to ventilate their gills and to maintain their swimming depth. Their slow continuous swimming speed may be the slowest possible for adequate ventilation, the slowest possible to maintain depth, or it may be the slowest possible for both.

Wavyback skipjack tuna have no gas bladder and are more dense than sea water (body density equals 1.08 grams per cubic centimeter, sea water density equals 1.02 grams per cubic centimeter); therefore, a fish weighing 1,080 grams (about 38 ounces) in air, still weighs 60 grams (about 2 ounces) submerged in sea water. These fish avoid sinking by continuously swimming; when they swim forward, hydrodynamic lift is exerted against their pectoral fins which act as hydrofoils. The amount of hydrodynamic lift exerted varies with their swimming speed. At slow speeds, wavyback skipjack extend their pectoral fins more than 90 percent of the time. As they increase their speed, they retract their pectoral fins for longer periods apparently to maintain swimming depth. Continuous extension at faster speeds would result in the fish rising to the surface. At speeds greater than 1.2 meters per second or 3.8 feet a second they extend those fins only part way and rarely more than 20 percent of the time.

The amount of gill ventilation obtained from a given speed is controlled in part by variations in the angle at which the mouth is held open and by the percent of time the mouth is completely closed. Pacific bonito (Sarda chiliensis) observed at Marineland of the Pacific in Palos Verdes, Calif., closed their mouths up to 42 percent of the time at slow speeds and had their pectoral fins extended almost continuously. It appears that even slower speeds than are required for hydrostatic lift would probably suffice for gill ventilation of tuna.

Studies are in progress at the Bureau's Kewalo Basin Laboratory in Honolulu, to learn more about the interaction between the gill ventilation and hydrostatic functions of continuous swimming in tuna and to determine how these functional components affect their behavior and activity.

* * * * *

SKIPJACK TUNA BLOOD-TYPING STUDIES EXPANDED:

The following summary of skipjack tuna blood-typing studies through July 1964 was issued by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii:

As a result of blood-typing studies in previous years, it is known that the skipjack tuna population distribution in the central Pacific can be broken down into a number of isolated breeding subpopulations, and that at least two different subpopulations of skipjack have appeared in Hawaiian waters. Those populations have been tentatively designated as Populations I and II.

To understand monthly features of the availability off Hawaii of the subpopulations, intensive observations have been made since mid-1963 by using blood samples taken at local fish markets or the cannery. The results show that Population I appeared intermittently during October 1963 and then in 1964 during the months of February, March, May, and June, while Population II was usually dominant from November through April. The alternative appearance of two populations was assumed to be possibly associated with changes of oceanographic environments in Hawaiian waters.

To attempt to clarify that assumption, a series of cruises by the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert has been carried out since June 1964. The missions included the collection, of blood samples from each skipjack school encountered, and oceanographic observations such as salinity, surface-water temperatures, and bathythermographic data. Although the results of the preliminary observations are encouraging, definite results can not be determined until the present investigation is completed.

Basic studies have been emphasized in order to improve large-scale investigations.

Such work includes the development of potential reagents for typing and finding new blood factors as well as determining their genetics. At present, 32 individual differences have been recognized as a combination of the 3 independent blood group systems. Expanded knowledge of those hereditary characteristics will be valuable in solving future problems.

* * * * *

TRADE WIND ZONE OCEANOGRAPHIC STUDIES CONTINUED:

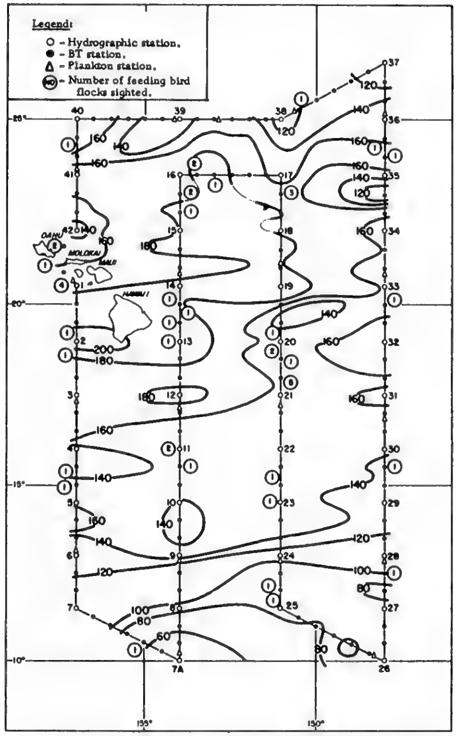
M/V "Townsend Cromwell" Cruise 6 (July 13-August 1, 1964): This was the sixth in a series of oceanographic cruises to determine rates of change in the distribution of properties in the trade wind zone of the central North Pacific. The research vessel Townsend Cromwell of the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, operated in the central North Pacific bounded by latitudes 10° N., 27° N. and longitudes 148° W., 158° W. during this cruise, which was completed August 1, 1964.

A total of 42 oceanographic stations were occupied along the cruise track and temperatures and samples for salinity analysis were obtained at each station at 20 depths to 1,500 meters. Deep casts to 4,000 and 5,000 meters had to be canceled because of a defect in the hydrowire.

The most noticeable change in the flow pattern during July was the relaxation of the currents in the area between 13° and 16° N. latitude, where a large counterclockwise eddy had been detected during the vessel's previous cruise (June 15-July 5, 1964). This relaxation appeared to be compensated for by an intensification of the North Equatorial Current south of 13° N. latitude.

Surface temperatures during this cruise showed a continuing trend of warming as indicated by the retreat of the 24° isotherm to the extreme northeast sector of the cruise area and by the appearance of the 27° isotherm in the southern section. Field plots of the oxygen distribution showed a pattern similar to the known oxygen distribution of the cruise region.

During the cruise, 49 feeding bird flocks were sighted, 4 of which were associated with skipjack tuna. Those flocks were more wide-



Track chart of the research vessel Townsend Cromwell Cruise 6 (July 13-August 1, 1964), showing depth contours of the 20° C. isotherm in meters.

ly scattered throughout the cruise area than were the 28 sightings of the previous cruise. The standard watch for bird flocks and fish schools was maintained during daylight hours.

Vessel operations on this cruise included: (1) Bathythermograms (BT) at 20-mile and at 10-mile intervals; (2) surface bucket temperatures and water samples for salinity analysis at each bathythermograph observation; (3) dissolved oxygen determinations for each water sample; (4) release of ten plastic enclosed drift cards at 30-mile intervals along the entire cruise track; (5) standard marine weather observations; (6) radiation measurements from the sun and sky; (7) colored photographs of cloud formations; (8) surface plankton tows, for a period of one-half hour, using a 1-meter net at 2000 daily; (9) collection and preserva-

tion of flyingfish that stranded themselves aboard ship; (10) ranging tests for implosion devices at stations 7, 7A, and 16, and between stations 37 to 42, in cooperation with the Pacific Missile Range.

Note: See Commercial Fisheries Review, October 1964 p. 22; September 1964 p. 15; August 1964 p. 17.

Export Opportunity

NEW SAMPLE DISPLAY SERVICE OFFERS EXPORT DEVELOPMENT OPPORTUNITY: To help United States firms establish agents and distributors in selected foreign markets, the U. S. Department of Commerce is sponsoring a Sample Display Service. The new service, administered by the Bureau of International Commerce, will permit United States businessmen to display their goods and sales information in showrooms at selected U. S. Foreign Service posts. The first displays will be at the U. S. Embassies in Beirut (Lebanon) and Manila (Philippines); the office of the U. S. Commercial Attache in Nairobi (Kenya); and the U. S. Trade Center in Bangkok (Thailand). Canned sardines is one of the items specifically recommended for display in Manila.

Manufacturers seeking to display goods under the new service may apply directly to the Bureau of International Commerce or to any U. S. Department of Commerce field office. After processing applications, the Bureau of International Commerce will send shipping instructions directly to the manufacturers.

Manufacturers taking advantage of the new service will supply merchandise samples and pay the cost of one-way freight from plant to foreign port of entry. The U. S. Department of Commerce will provide the foreign display facilities, the agent-finding service, customs and storage services abroad, and if necessary, take care of the return freight service. The displays will be geared to smaller products, but large, heavy products may be put on exhibit through the use of cutaways, models, films, or slides.

Samples and literature will be displayed for 30 days. Sample displays will be under the management of the U. S. Commercial Attache in each city. Sample display staffs will mount the exhibits, campaign to attract agents and distributors to the showrooms, demonstrate products, prepare summary reports for exhibitors, recommend the most qualified of the foreign representatives who express interest in a product, and supply a business report on each of those representatives. Exhibitors will then negotiate directly with the representatives they select. (International Commerce, September 7, 1964, U. S. Department of Commerce.)

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-AUGUST 1964:

Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, less fresh and frozen fishery products were purchased in August 1964 than in the previous month. The decline was 10.8 percent in quantity and 2.4 percent in value. Compared with the same month in the previous year, purchases in August 1964 were down 4.5 percent in quantity and 3.4 percent in value.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, August 1964 with Comparisons

QUANTITY				VALUE			
Aug.		Jan.-Aug.		Aug.		Jan.-Aug.	
1964	1963	1964	1963	1964	1963	1964	1963
. . . . . (1,000 Lbs.)				. . . . . ($1,000)			
1,899	1,989	17,413	15,820	1,142	1,182	9,355	8,950

Total purchases in the first 8 months of 1964 were up 10.1 percent in quantity and 4.5 percent in value from those in the same period of the previous year. In January-August 1964 there were larger purchases of shrimp and scallops, but noticeably lower purchases of cod fillets, ocean perch fillets, and swordfish steaks (see table 2).

Canned: In the first 8 months of 1964, total purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) were up 71.4 percent in quantity and 74.5 percent in value from those in the same period of 1963. The increase was due to larger purchases of tuna and salmon. The gain was partly offset by smaller purchases of canned sardines (see table 3).

Freeze-Dried: Fishery purchases for the Armed Forces in August 1964 included 32,564 pounds of freeze-dried groundfish (cod or

Table 2 - Purchases of Principal Fresh and Frozen Fishery Products by Defense Subsistence Supply Centers, August 1964 with Comparisons

Product	August				January-August	
	1964		1963		1964	1963
	Quantity	Cost	Quantity	Cost	Quantity	
	Pounds	Cents/Pound	Pounds	Cents/Pound	. . . . . (Pounds)	
Shrimp:						
Raw headless	57,000	84.1	1/	1/	855,450	1/
Peeled and deveined	254,708	108.0	1/	1/	863,422	1/
Breaded	296,100	68.1	1/	1/	2/2,815,000	1/
Molded and breaded	75,000	59.0	1/	1/	349,770	1/
Total shrimp	682,808	83.3	780,922	82.8	4,883,642	4,465,414
Scallops	112,230	59.9	236,285	52.9	2,103,090	1,886,650
Oysters:						
Eastern	45,952	97.6	1/	1/	557,582	1/
Pacific	19,464	62.9	1/	1/	191,936	1/
Total oysters	65,416	87.3	95,789	101.9	749,518	757,778
Clams	16,542	31.3	19,482	33.3	198,351	181,164
Fillets:						
Cod	20,500	26.5	34,528	28.4	302,166	455,849
Flounder	170,100	27.6	199,120	29.6	2/2,207,866	2,184,254
Ocean perch	246,500	25.6	281,093	29.6	2,370,420	2,584,625
Haddock	92,400	31.0	135,036	33.7	2/1,348,854	1,523,469
Haddock portions	135,224	48.6	-	-	155,814	-
Steaks:						
Halibut	113,005	41.8	124,844	39.0	873,077	937,021
Salmon	19,300	69.0	14,406	61.2	144,525	128,587
Swordfish	1,150	48.5	3,020	52.8	9,580	22,750

1/Breakdown not available.
2/Revised.

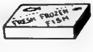
Table 3 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, August 1964 with Comparisons

Product	QUANTITY				VALUE			
	Aug.		Jan.-Aug.		Aug.		Jan.-Aug.	
	1964	1963	1964	1963	1964	1963	1964	1963
	. . . . (1,000 Lbs.)				. . . . ($1,000)			
Tuna	599	-	3,216	2,064	254	-	1,455	1,007
Salmon	1/	-	679	18	2/	-	416	12
Sardine	67	11	242	332	32	4	143	135

1/Less than 500 pounds.
2/Less than $500.

haddock) with an average value of $5.40 per pound, and 2,239 pounds of freeze-dried shrimp with an average value of $10.46 per pound.

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than indicated because data on local purchases are not obtainable.
(2) See Commercial Fisheries Review, Oct. 1964 p. 23.



Foreign Fishery Reporting

UNITED STATES FISHERY ATTACHE PROGRAM IN FOREIGN COUNTRIES:

The United States Fishery Attache Program has been developed by the Departments of State and Interior to meet the growing responsibilities and interests of the United States Government and domestic fishing industry in foreign fisheries. To date, four fishery attache posts have been established in foreign countries as follows:

Mexico City, Mexico: Regional fisheries officer for Latin America has direct responsibility for fishery reporting from Mexico and regional responsibilities for 18 other countries. The post was established by the Department of State in 1957 and was filled by Milton J. Lindner; since January 1964, Richard S. Croker has been the Fishery Attache.

Tokyo, Japan: This is a one-country post, established by the Department of State in 1958. The first incumbent was Wilvan G. Van Campen; present incumbent is Arnie J. Suomela, who took up his duties as Fishery Attache in April 1961.

Copenhagen, Denmark: Fishery attache for Europe has direct responsibility for fishery reporting from Denmark and regional responsibilities for all other European countries, including the U. S. S. R. The post was established by the Department of State in 1961, and Andrew W. Anderson was selected as the first incumbent. In August 1964, an Assistant Fishery Attache, Salvatore DiPalma, was appointed as a result of the increased workload and travel requirements of that post.

Abidjan, Ivory Coast: The regional fisheries post for West and South Africa was es-

tablished in 1963; the position was filled in January 1964 by George B. Gross.

Freezing

USE OF LIQUID NITROGEN TO FREEZE FISH STUDIED:

The relatively new technique of using liquid nitrogen to freeze fishery products offers considerable promise to the fishing industry in improving process procedures as well as quality of the product. This is particularly true in the production of individually quick-frozen items, where throughput will be greatly increased; weight losses (which run as high as 10 percent in blast freezers) will be eliminated; and color, flavor, and texture may be better maintained than when conventional freezing methods are used.

But there are several technological problems connected with liquid nitrogen freezing that may cause difficulty if the process is adopted without sufficient research. Chief among those problems is that too rapid cooling will cause the product to crack or even to shatter. Generally the damage is very obvious, but occasionally it may not show up until the product is subjected to further processing such as freeze-drying.

As part of the project on the Investigation of New Refrigeration Techniques conducted by the U. S. Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass., tests were made to delineate precisely the parameters involved in liquid nitrogen freezing of various fishery products. In preliminary tests with haddock fillets it was found that no damage occurs when nominal freezing rates of 2.0 to 7.0 centimeters per hour are used. With conventional equipment a nominal freezing rate above 0.5 centimeters per hour is considered to be good commercial practice.

Fur Seals

PRIBILOF ISLANDS FUR SEAL SKIN HARVEST, 1964:

During the 1964 sealing season, the harvest of fur seal skins by the Pribilof Islands staff of the U. S. Bureau of Commercial Fisheries amounted to 64,209 skins. Of that total, 48,602 skins were harvested on St. Paul Island and 15,607 skins on St. Georges Island.

Removal of blubber is an early step in processing seal skins. Trained workers are shown performing this preliminary step in skin processing on St. Paul Island.

The fur seal skin harvest in 1964 was below the 1963 harvest by 21,045 skins. In 1963, a total of 85,254 skins was harvested as compared with 77,915 skins in 1962.

Note: See Commercial Fisheries Review, January 1963 p. 28.

Great Lakes Fisheries Explorations and Gear Development

STUDIES ON TRAWLING OF COMMERCIAL SPECIES IN LAKE SUPERIOR CONTINUED:

M/V "Kaho" Cruise 20 (August 7-22, 1964): Investigating possible ways to improve methods for catching and handling Lake Superior commercial fish species was the principal objective of this 16-day cruise in Lake Superior from Whitefish Bay to the Keweenaw Peninsula. This was the second of three scheduled cruises for that purpose by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Kaho.

Although primary consideration was given to determining the seasonal availability of the various species of fish to bottom trawls and locating additional areas suitable for trawling, other activities of the cruise were concerned

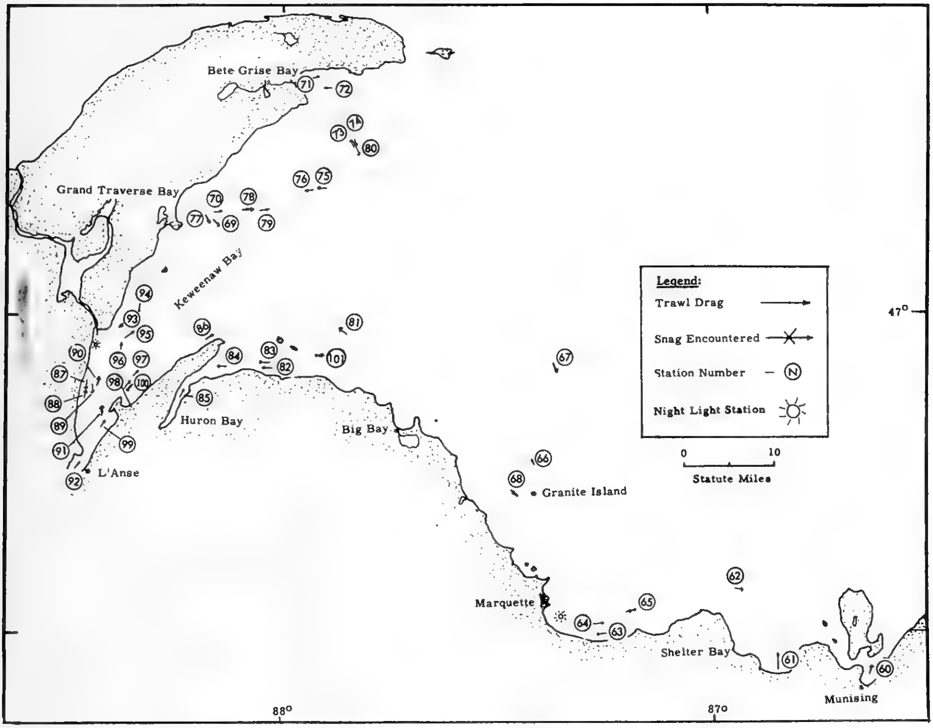


Fig. 1 - Shows area of operations (Munising to Keweenaw Peninsula) during Kaho Cruise 20, August 7-22, 1964.

with (1) attempts to attract fish with submersible lights, (2) collecting length-frequency data on chub, herring, and alewife, (3) obtaining samples of fish for botulism studies, and (4) collecting water samples for limnological investigations.

Good to excellent catches of chub were taken east of the Keweenaw Peninsula near Bete Grise Bay and in Keweenaw Bay, and fair catches of smelt were taken in Keweenaw Bay and Huron Bay. Catches of cisco (lake herring) were insiginficant with the best catch (35 pounds) recorded from Huron Bay. Only two significant catches of common whitefish were taken during the cruise. Dense concentrations of fish were located in several areas monitored during Kaho Cruise 18 (May 25-June 10, 1964). Direction of tow greatly influenced the catch on several drags indicating direction of water current to be a contributing factor in trawl catch rates.

Attempts to attract fish to a special 500-watt white light lamp near the surface were unsuccessful.

Additional trawlable grounds in deeper than 60 fathoms were located north of Granite Island and south of Manitou Island using a high-resolution, white-line-type echo-sounder.

A total of 56 drags was made during the cruise with a 52-foot (headrope) Gulf of Mexico-type fish trawl. Of the total, 42 were completed from Munising west to the Keweenaw Peninsula and 12 in and near Whitefish Bay. All drags lasted 30 minutes except 8 which were terminated early when the net either became fouled on bottom obstructions

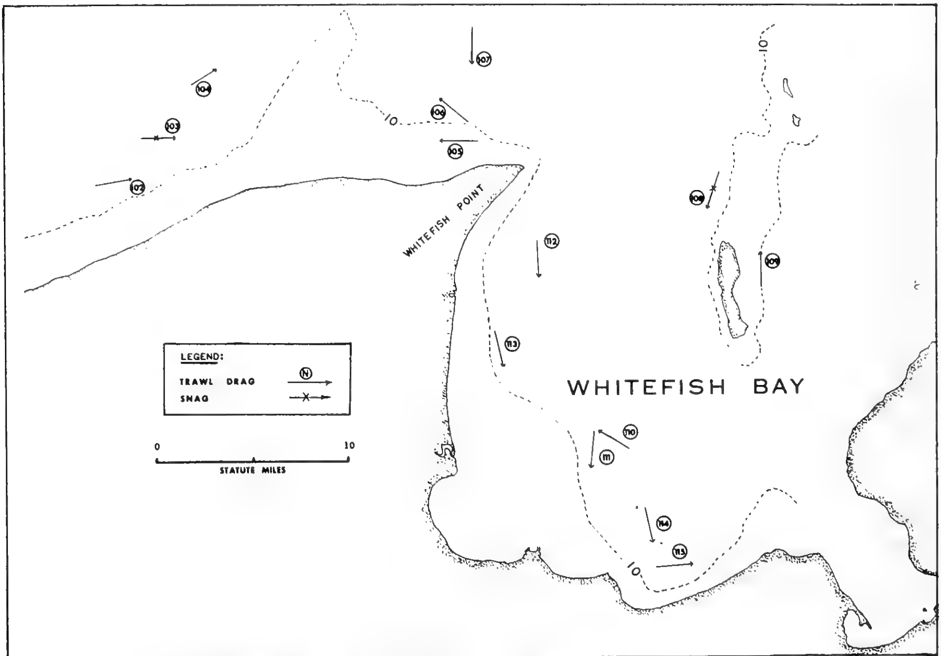


Fig. 2 - Shows area of operations (Whitefish Bay) during Kaho Cruise 20, August 7-22, 1964.

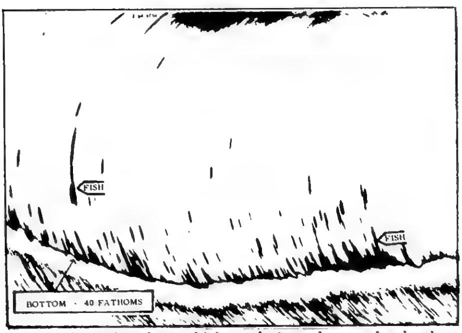


Fig. 3 - Recording from a high-resolution echo-sounder showing the bottom profile and fish on the bottom and at midwater depths. Recording was made at station 75, south of Bete Grise Bay, at a depth of 40 fathoms. Catch consisted of 520 pounds of chubs.

or because of the presence of gill nets in the area, and one drag which was extended to 60 minutes to study the production rates of longer drags. Severe damage to the trawl occurred during 2 encounters with snags. Stumps, logs, branches, and rocks were picked up in 7 drags resulting in only minor damage to the trawl on 4 such occasions and no damage in the remaining 3 encounters.

Commercially significant catches of chub (over 200 pounds per 30-minute drag) were taken off the east shore of Keweenaw Peninsula, Keweenaw Bay, and Huron Bay in 35-45, 30-40, and 11-15 fathoms, respectively. The best catch of chub (1,210 pounds) was in 40 fathoms in Keweenaw Bay. The catch consisted of about 70 percent (by weight) or 850 pounds of chub over 9 inches long. Most catches of smelt (ranging up to 240 pounds) occurred in the 8- to 16-fathom depth range and were composed chiefly of 36 count (number per pound) fish. One 45-pound catch of smelt from 25 fathoms in Keweenaw Bay was largely of 16-count fish.

Only small quantities of cisco (lake herring) were caught throughout the areas fished. After-dark experiments with a light in areas

where commercial gill-net fishermen were catching herring proved unsuccessful in attracting fish to the surface.

Catches of lake trout occurred at an average rate of 10 fish per drag for the entire cruise. Most of the fish were under 9 inches long and only 3 were native (not planted) fish. Special efforts were made to return the fish to the water in good condition. Recovery live tanks were used aboard the vessel to allow the fish to regain their equilibrium before being released. A hypodermic needle was also used successfully to "deflate" bloated fish. It was estimated that over 90 percent of the trout collected were returned to the water in good enough condition to survive.

During the last phase of the cruise, 14 of 15 established stations in Whitefish Bay and surrounding area were monitored. Catches were generally insignificant with the best catch being 120 pounds of chub taken in 35-40 fathoms north of Whitefish Point.

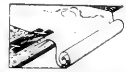
On this cruise, bacteriologists from the University of Wisconsin accompanied the Kaho to collect various species of fish and bottom material for botulism investigations. A biologist from the Bureau's Ann Arbor Biological Laboratory also accompanied the vessel to record length-frequency data on alewife, chubs, and cisco.

Note: See Commercial Fisheries Review, September 1964 p. 20; August 1964 p. 25.

* * * * *

SEASONAL DISTRIBUTION AND ABUNDANCE STUDIES OF ALEWIFE, CHUB, AND YELLOW PERCH IN LAKE MICHIGAN CONTINUED:

M/V "Kaho" Cruise 21: To extend knowledge of the seasonal distribution and abundance of alewife, chub, and yellow perch in Lake Michigan and their availability to bottom trawls was the primary purpose of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing and gear research vessel Kaho. The cruise announcement on August 18, 1964, indicated the vessel would conduct trawl explorations in northern Lake Michigan and Green Bay (August 25-September 3, 1964) and in lower and central Lake Michigan (September 9-18, 1964). The cruise plan called for: (1) echo-sounding with high-resolution equipment to record bottom and off-bottom fish concentrations; and (2) trawling with a 52-foot trawl at standard stations (30-minute tows at 5-fathom intervals from 5 to 50 fathoms) to assess the seasonal commercial trawling potential.

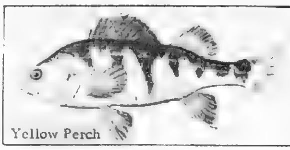


Great Lakes Fishery Investigations

LAKE ERIE YELLOW PERCH LANDINGS DOWN SHARPLY IN 1964:

Commercial landings of yellow perch at Lake Erie by United States and Canadian fishermen dropped sharply in 1964. The yellow perch catch for the first 6 months in 1964 was less than one-third that for the same period in 1963. On that basis, it is estimated that landings of that species for all of 1964 will amount to less than 10 million pounds--the lowest since 1955.

Annual landings of yellow perch from Lake Erie have averaged only about 7 million pounds for the past 50 years. Until the 1950's, the yellow perch was considered secondary to such "money" species as whitefish, blue pike, and yellow pike (walleye).


Yellow Perch

It is only since the disappearance or sharp decline of those higher value species in recent years that producers have come to depend upon the yellow perch to keep them in business.

The yellow perch fishery (United States and Canada) reached an all-time high production level in 1956-63, averaging well over 20 million pounds a year. Why then, the sudden drop in landings in 1964? Two factors are believed principally responsible--fluctuations in year-class strength (i. e., numbers of fish that hatch and survive in a given year) and a pronounced slowing of growth rate in recent years.

Relatively strong year-classes of yellow perch were produced in the mid-1950's, topped by an exceptionally good hatch in 1959. Landings from those combined year-classes brought landings to the record highs that were sustained through 1963. But during the more recent of those high production years, the hatches of yellow perch were not always good. The 1960 year-class, for example, is known to have been very weak. That poor

year-class is the one upon which the fishery must depend for the bulk of its catch in 1964.

Concurrent with the large populations that permitted high production in 1956-63 has come a slowing of the growth rate. As late as 1956, many of the yellow perch landed in Lake Erie's western basin were fish that had required only three growing seasons to reach a length of 8½ inches (then the legal minimum length in Ohio). By 1959, yellow perch required four growing seasons to attain the same size. By 1964, at least four years were required for most perch to grow to the shorter legal length of 8.0 inches (the minimum legal length in Ohio since May 1, 1964). The declining growth rate in 1959-64 is illustrated in the table of average lengths of perch taken in trawls at the end of each growing season in those years. The decline may be a natural consequence of increased competition for space and food--although from what is known most small forage fishes were maintaining themselves in large numbers in 1959-64. (Just as perch grew faster when the population was less dense, the relatively scarce yellow pike or walleye are now growing far more rapidly than during the years when they were abundant).

The 1961 year-class of yellow perch was only fair, but the hatch in 1962 was unusually large--the largest on record. If the growth rate of those two year-classes had been similar to that of fish living in the lake in the mid-1950's, both would by now have entered the commercial fishery. Actually, only the largest individuals of the 1961 year-class were taken during the spring of 1964. The 1962 year-class had not entered the commercial fishery by midsummer, although large numbers--nearly all less than 8 inches long--were being taken by anglers. It is unlikely that this year-class will be represented in significant numbers during the balance of 1964, in spite of the reduced size limit of Ohio. (The change in regulation has, nevertheless, benefited the fishermen to some extent. About 20 percent of the legal-size perch now being landed in Ohio are less than 8½ inches long. Many of those smaller fish are of the 1961 year-class.)

Average Total Length of Yellow Perch Taken in Trawls in Western Lake Erie at the End of the Growing Season, 1959-64

Seasons of Growth Completed	Year-Class					
	1959	1960	1961	1962	1963	1964
	(Inches)					
1	4.0	3.6	3.6	3.2	3.3	1/3.3
2	6.9	6.7	6.4	5.8	1/5.8	-
3	7.8	7.5	7.4	1/7.2	-	-
4	8.5	8.2	1/8.0	-	-	-
5	9.2	1/8.8	-	-	-	-
6	1/9.6	-	-	-	-	-

1/Estimated length at end of growing season based on length-frequency data collected in August 1964.

Earlier predictions that the 1962 hatch of yellow perch would begin to enter the fishery by the fall of 1964 will not be realized because of the slower growth rate. Furthermore, experimental trawling during the past year has indicated a heavier natural mortality of perch of that extremely large year-class than was anticipated (undoubtedly due in part to extensive "die-offs" in the western and central basin during the past two summers). The outlook therefore is not as encouraging as it appeared to be earlier, even though large numbers of the 1962 year-class are still present.

Barring catastrophies such as additional severe "die-offs," the yellow perch catch should pick up again in 1965 and improve further in 1966 when the presumed still-strong 1962 year-class is expected to be completely available to the fishery.

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-20 (August 21-September 1, 1964): Shrimp distribution studies in the Gulf of Mexico were continued during this cruise by the chartered research vessel Gus III of the U. S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex. Eight statistical areas were covered and standard 3-hour tows with a 45-foot Gulf shrimp trawl were made.

During this cruise, 34 tows with a 45-foot flat traw, 63 plankton tows, 59 bathythermograph, and 41 Nansen bottle samples were taken. Also, 162 drift bottles were cast at 27 stations, and one 24-hour current meter station was occupied.

Catches were generally spotty and were only fairly productive in three of the areas worked where catches of brown shrimp ranged from 32 to 59 pounds. Area 16 yielded a good catch (48 pounds) of 15-20 count brown shrimp from the over 20-fathom depth range. The other two depth ranges in that area yielded only a scattering of white and pink shrimp.

The largest catch of brown shrimp of the cruise was from area 20--a total of 59 pounds

pounds (mostly 25-30 count) from all three depth ranges. That area also yielded 5 pounds of 15-20 count pink shrimp from the 0-10 fathom depth.

Area 18 accounted for a total of 43 pounds with the largest catch (27 pounds of mostly brown 21-25 count shrimp) from the 10-20 fathom depth. A 14-pound catch from the 0-10 fathom depth range of that area was made up of 8 pounds of 21-25 count white shrimp and 6 pounds of small brown shrimp (68 count).

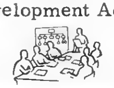
A total of 21 pounds of white 21-25 count shrimp was taken from 0-10 fathoms in area 17, together with 3 pounds of small brown shrimp. Shrimp catches were small in the three depth ranges of the other areas worked during this cruise.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, October 1964 p. 26.

Gulf States Marine Fisheries Commission

ANNUAL MEETING IN BROWNSVILLE, TEXAS: The Fifteenth Annual Meeting of the Gulf States Marine Fisheries Commission was held in Brownsville, Tex., October 15-16, 1964. The opening general session on October 15 included an address by the Commissioner, 8th U. S. Coast Guard District, and an address by the U. S. Bureau of Commercial Fisheries Chief Adviser on Oceanographic Research.

At the general session on October 16, the Texas Parks and Wildlife Department gave a progress report on Texas blue crab studies. The U. S. Bureau of Commercial Fisheries presented a film on shrimp explorations in the southwest Caribbean, and gave a progress report on the Commercial Fisheries Research and Development Act (P. L. 88-309).



Industrial Fishery Products

U. S. FISH MEAL, OIL, AND SOLUBLES:

Production by Areas, August 1964: Preliminary data on U. S. production of fish oil, and solubles for August 1964 as collected by the U. S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

U. S. Production1/ of Fish Meal, Oil, and Solubles by Areas, August 1964 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized3/
	Short Tons	1,000 Pounds	. . . (Short Tons) . . .	
August 1964:				
East & Gulf Coasts.	29,605	23,174	12,530	-
West Coast2/ .	3,732	2,558	1,871	-
Total	33,337	25,732	14,401	-
Jan.-Aug. 1964 Total	158,966	132,411	65,037	-
Jan.-Aug. 1963 Total	170,779	133,924	67,458	7,134

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes American Samoa and Puerto Rico.
3/Includes condensed fish.

* * * * *

Production, July 1964: During July 1964, a total of 41,663 tons of fish meal and scrap and 31.8 million pounds of marine animal oils was produced in the United States. Compared with July 1963 this was an increase of 3,171 tons in meal, and about 2.8 million pounds in oil production. Fish solubles production amounted to 16,271 tons--an increase of 1,093 tons compared with July 1963.

Menhaden meal production for July 1964 amounted to 33,089 tons--an increase of 1,981 tons compared with July 1963, and menhaden oil totaled 25.9 million pounds--an in-

U. S. Production of Fish Meal, Oil, and Solubles, July 19641/ with Comparisons

Product	July 1/1964	July 1963	Jan.-July 1/1964	Jan.-July 1963	Total 1963
	. . . . (Short Tons) . . .				
Fish Meal and Scrap:					
Herring	3,256	2,320	4,940	2,619	7,537
Menhaden 2/	33,089	31,108	96,110	99,705	181,750
Tuna and mackerel	1,741	1,282	10,207	11,651	26,957
Unclassified	3,577	3,782	14,372	15,569	22,415
Total	41,663	38,492	125,629	129,544	238,659
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	14,793
Grand total meal and scrap	3/	3/	3/	3/	253,452
Fish solubles:					
Menhaden	14,758	13,096	39,878	40,073	74,831
Other	1,513	2,082	10,758	14,089	25,347
Total	16,271	15,178	50,636	54,162	100,178
Homogenized condensed fish	-	2,531	-	6,372	7,224
	. . . . (1,000 Pounds) . . .				
Oil, body:					
Herring	3,086	2,021	5,234	2,515	5,709
Menhaden 2/	25,898	25,391	94,630	90,292	167,635
Tuna and mackerel	499	378	2,257	2,030	5,735
Other (including whale)	2,299	1,200	4,558	3,742	6,748
Total oil	31,782	28,990	106,679	98,579	185,827

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.

crease of 507,000 pounds over July 1963. Herring meal production amounted to 3,256 tons--an increase of 936 tons as compared with July 1963. Oil produced from herring amounted to about 3.1 million pounds, an increase of 1.1 million pounds compared with July 1963. Tuna and mackerel meal production (1,741 tons) showed an increase of 459 tons, and tuna and mackerel oil production amounted to 449,000 pounds--up 121,000 pounds.

* * * * *

Major Indicators for U. S. Supply, July 1964: United States production of fish meal in July 1964 was higher by 8.2 percent as compared with July 1963. Production of fish oil was up by 9.6 percent and that of fish solubles decreased 8.1 percent.

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, July 1964

Item and Period	1/1964	1963	1962	1961	1960
	. . . . . (Short Tons)				
Fish Meal:					
Production:					
July	41,663	38,492	55,602	63,435	56,262
January-June 2/	83,966	91,052	121,836	102,502	80,231
Year 3/	-	253,452	312,259	311,265	290,137
Imports:					
July	28,863	43,223	25,857	18,710	13,131
January-June	256,429	181,934	140,886	107,826	66,375
Year	-	383,107	252,307	217,845	131,561
Fish Solubles 4/:					
Production:					
July	16,271	17,709	22,207	22,589	18,876
January-June 2/	34,365	42,825	51,507	40,200	36,946
Year	-	107,402	124,334	112,241	98,929
Imports:					
July	1,506	330	306	708	96
January-June	2,051	2,439	4,290	1,219	2,518
Year	-	6,773	6,308	6,739	3,174
	. . . . . (1,000 Lbs.)				
Fish Oils:					
Production:					
July	31,782	28,990	47,695	57,239	40,487
January-June 2/	74,897	69,589	95,622	89,026	56,340
Year	-	185,827	250,075	258,118	209,143
Exports:					
July	40,449	29,343	128	4,421	40,603
January-June	56,139	97,806	63,005	68,127	52,820
Year	-	262,342	123,050	122,486	143,609

1/Preliminary.
2/Data for 1964 based on reports which accounted for the following percentage of production in 1963: Fish meal, 95 percent; solubles and homogenized fish, 99 percent; and fish oils, 99 percent.
3/Small amounts (10,000 to 25,000 pounds) of shellfish and marine animal meal and scrap not reported monthly are included in annual totals.
4/Includes homogenized fish.

* * * * *

U.S. FISH MEAL AND SOLUBLES:

Production and Imports, January-July 1964: Based on domestic production and imports, the United States available supply of fish meal for January-July 1964 amounted to 410,921 short tons--56,220 tons (or 15.8 percent) more than during January-July 1963. Domestic production was 3,915 tons (or 3.0 percent) less, but imports were 60,135 tons (or 26.7 percent) higher than in January-July 1963. Peru continued to lead other countries with shipments of 227,325 tons.

The United States supply of fish solubles (including homogenized fish) during January-July 1964 amounted to 54,193 tons--a decrease of 14.4 percent as compared with the same period in 1963. Domestic production dropped 16.4 percent but imports of fish solubles increased 28.5 percent.

U. S. Supply of Fish Meal and Solubles, January-July 1964 with Comparisons

Item	Jan.-July 1/1964	Jan.-July 1963	Total 1963
	. . . (Short Tons) . . .		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	96,110	99,705	181,750
Tuna and mackerel	10,207	11,651	26,957
Herring	4,940	2,619	7,537
Other	14,372	15,569	37,208
Total production	125,629	129,544	253,452
Imports:			
Canada	34,509	30,752	50,925
Peru	227,325	167,542	291,544
Chile	10,587	19,088	24,249
Norway	-	1,819	1,819
So. Africa Republic	10,738	4,826	12,296
Other countries	2,133	1,130	2,274
Total imports	285,292	225,157	383,107
Available fish meal supply	410,921	354,701	636,559
Fish Solubles:			
Domestic production	50,636	2/60,534	2/107,402
Imports:			
Canada	1,162	1,541	2,034
Iceland	-	105	160
So. Africa Republic	860	191	411
Other countries	1,535	932	4,168
Total imports	3,557	2,769	6,773
Available fish solubles supply	54,193	63,303	114,175

1/Preliminary.
2/50-percent solids. Includes production of homogenized condensed fish.

* * * * *

MENHADEN CATCHES NORTH OF CHESAPEAKE BAY DECLINE:

A serious decline in menhaden catches during the 1964 fishing season in all areas north of Chesapeake Bay has had particularly serious effects on industrial fishery products processors in New Jersey, where the supply has been dwindling for several years. Chesapeake Bay has been affected also, for although the total menhaden catch for that region is about the same as in previous years, the northern fleet has moved into Chesapeake Bay to share that catch.

Industry leaders met this past August with representatives of the U. S. Bureau of Commercial Fisheries to review the situation and determine what action should be taken. Information presented by the Bureau showed that no outstandingly successful spawning of menhaden has occurred since 1958. The very large groups of fish born in 1958 has been the main support of the fishery since 1959, but those fish have virtually disappeared through the effects of fishing and natural die-off. Bureau scientists also have discovered that the Chesapeake Bay and New Jersey fisheries are harvesting the same population of

fish. These menhaden are first taken in the Chesapeake region and move to northern waters as they increase in age, which means the Chesapeake fishery has the advantage of harvesting those fish before they migrate to New Jersey and New England.

Since 1956, the proportion of the total catch taken in the Chesapeake area has increased from 33 to 74 percent. Thus, the declining New Jersey menhaden catch is caused by a combination of temporarily reduced spawning success and increased fishing pressure in the Chesapeake region. The trend is expected to continue and the northern fishery is not likely to improve unless fishing effort in the Chesapeake is reduced substantially. This is a difficult problem to resolve and it can be resolved only by the industry itself, but with all the assistance possible by the Bureau to help bring that industry to a better and more equitable ecoomic level.

* * * * *

U.S. FISH OIL PRODUCTION FORECAST FOR 1964:

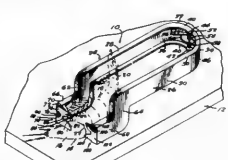
U.S. production of fish oil (including whale and seal oil, but excluding fish-liver oil) is forecast at 200.0 million pounds in 1964. That would be a gain of about 7.6 percent over the 185.8 million pounds produced in 1963. (Fats and Oils Situation, August 1964, U.S. Department of Agriculture.)

Editor's Note: In January-July 1964, U.S. fish oil production totaled 106.7 million pounds, an increase of 8.2 over the 98.6 million pounds produced in the same period of 1963.

Inventions

SHRIMP HEAD AND VEIN REMOVING TOOL PATENTED:

The inventor of a design for a hand-operated tool to remove the head and pull out the sand vein of shrimp in one operation claims a cleaner, more sanitary, and efficient way of heading shrimp. The inventor states



that the tool should be constructed entirely of noncorrosive material, preferably stainless steel, but plastics could be used for handles. The tool has been tested. (Patent No. 3,126,576 SIC 3461; granted Bjarne Johannesen, 3349 Drexel Avenue, Port Arthur, Tex.)

Louisiana

FISHERY LANDINGS, 1963:

Summary: The total commercial catch of fish and shellfish landed in Louisiana in 1963 was down 2 percent in quantity, but up 16 percent in value from the previous year. Important gains in the shrimp catch were responsible for the overall increase in value. Menhaden, shrimp, and oysters accounted for 95 percent of the total Louisiana catch in 1963.

Fig. 1 - Southern marine districts are important producers of fish and shellfish.

Shrimp: Louisiana shrimp landings in 1963 were the highest in 10 years and represented 40 percent of the combined shrimp landings from all Gulf States in 1963.

During the winter months of 1963, unfavorable weather conditions were more prevalent than usual. Severe cold fronts repreatedly lashed Louisiana coastal areas. Despite the bad weather, fairly good shrimp catches were landed in the winter of 1963. During that period, there was evidence of a populous small white shrimp crop in areas west of the Mississippi River. The protection given that crop by a closed season was probably responsible for the record May 1963 catch of over 1.0 million pounds of white shrimp.

Fig. 2 - Medium shrimp trawler docked at Westwego, La.

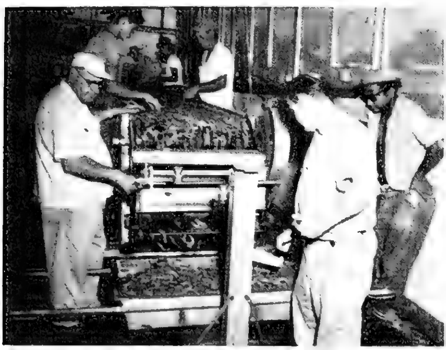


Fig. 3 - Prior to weighing shrimp unloaded from a fishing vessel at Westwego, La., unsuitable shrimp and marine debris are removed from inspection belt prior to weighing. On the scale is a tared weighing bucket.

The Louisiana Wild Life and Fisheries Commission established May 15, 1963, as the opening date for shrimp trawling in the inside waters. A "bumper crop" of brown shrimp had been predicted in the inside waters, and at the opening of the season, brown shrimp were abundant in all areas. The greatest concentrations were found west of the Mississippi River. Landings were so great for several days that the supply exceeded the processing capacity of the canners. Catches leveled off by early June, but continued at an exceptionally good pace until the season closed July 15, 1963.

The fall white shrimp season opened on August 19, 1963, and was even more productive than the spring brown shrimp season. Craft of all sizes, including numerous outboard motor rigs, participated in the harvest. Extremely good catches continued through November. October was the peak production month with white shrimp landings of 10.3 million pounds (heads-off weight).

Canning plants operated at peak capacity during the 1963 shrimp season and shore employment was at a high level. The canners packed nearly 717,000 standard cases--the largest shrimp pack since 1953.

Shrimp prices declined sharply in 1963. In May 1963, ex-vessel prices for small brown shrimp (68 and over count, heads-off weight) averaged approximately $24.50 per 210-pound barrel (heads-on weight) as compared with $49.00 per barrel for the same size-count in May 1962. Prices for large shrimp (15-20 count, heads-off weight) held fairly steady until August 1963.

Oysters: The Louisiana oyster harvest in 1963 yielded 11.6 million pounds of meats valued at $3.7 million. That was the highest catch recorded since 1939 when 13.6 million pounds were reported. Canning plants received the majority of the landings and packed approximately 173,000 standard cases of oysters. The canned pack yield of the 1963 oyster landings was less than expected. There was an unusual tenderness in the texture of the meats during the spring season. That made mechanical shucking difficult and resulted in an abnormal percentage of the meats being broken during processing.

The fresh oyster trade was fairly active in 1963. Large quantities of shell-stock oysters were trucked to processors in other states.

Crabs: Louisiana hard blue crab landings in 1963 of 8.0 million pounds (down 16 percent from the previous year) were the lowest since 1954. There was less effort expended in the crab fishery in 1963 because a number of fishermen shifted to the more profitable shrimp fishery. Crab plants produced approximately 570,000 pounds of fresh-picked crab meat with a wholesale value of $672,000. The demand for fresh-picked crab meat was good throughout most of the year and resulted in fairly stable prices.

Louisiana Fishery Landings, 1962-1963				
Species	1963		1962	
	Quantity	Value	Quantity	Value
	1,000 Lbs.	$1,000	1,000 Lbs.	$1,000
Shellfish:				
Shrimp (heads-on):				
Salt-water	80,797.4	19,786.8	43,583.7	14,985.0
Fresh-water	16.6	3.9	1.6	0.2
Oysters (market)	11,563.2	3,720.1	10,159.7	3,316.4
Crabs, blue:				
Hard	7,981.9	447.1	9,522.9	462.5
Soft and peeler	328.7	164.4	343.9	171.9
Crawfish, fresh-water	2,118.4	300.1	3,097.1	408.2
Other shellfish	253.4	132.3	278.3	122.6
Total shellfish	103,059.6	24,554.7	66,987.2	19,466.8
Salt-water Fish:				
Edible fish	2,535.9	358.9	3,017.8	424.3
Menhaden	633,484.3	7,861.9	689,157.4	7,994.2
Unclassified fish for bait, reduction, and animal food	6,970.8	87.4	2,200.0	27.5
Total salt-water fish	642,991.0	8,308.2	694,375.2	8,446.0
Fresh-water Fish:				
Catfish and bullheads	8,665.3	1,766.6	8,826.3	1,800.5
Buffalofish	3,487.6	398.7	3,546.2	419.5
Other fresh-water fish	2,458.7	167.1	2,885.4	200.9
Total fresh-water fish	14,611.6	2,332.4	15,257.9	2,420.9
Total Louisiana landings	760,662.2	35,195.3	776,620.3	30,333.7

Note: Oysters are reported in pounds of meats (8.75 pounds per gallon). All other species are shown in round weight.

Fig. 4 - Menhaden vessel docked at a fishery industrial products plant in Empire, La.

Menhaden: Landings of 633.5 million pounds of menhaden in 1963--representing the second largest Louisiana catch in the history of the fishery--were 8 percent below the record catch in 1962. Considerable fishing time was lost in 1963 due to unfavorable weather on the menhaden grounds. The 1963 Louisiana menhaden catch yielded 66,200 tons of meal, 7.9 million gallons of oil, and 5.0 million gallons of solubles. Those industrial products had a combined value of $13.1 million. The oil market was sluggish in the beginning of 1963 with large stocks carried over from the previous season, but market conditions improved in the summer and continued an upward trend during the remainder of the year.

Edible Finfish: Louisiana landings of finfish for human consumption in 1963 amounted to 17.1 million pounds valued at $2.7 million. Fresh-water species, as usual, accounted for the bulk of the catch. All of the leading fresh-water species registered slight declines in 1963. The market weakened in the spring months and prices to the fishermen were reduced.

Recurrent fish kills in the Mississippi River have aroused much concern. Massive fish kills were reported for the fourth successive year in areas extending from above Baton Rouge to the mouth of the River. Similar kills occurred in the Atchafalaya River, Bayou Grand Caillou, and Bayou Black. Investigations conducted by the Louisiana Wild Life and Fisheries Commission's Water Pollution Control Division indicated that pesticides may have caused the fish kills. In some cases, pollution from industrial operations was believed to have contributed to the fish losses.

Miscellaneous: Louisiana reports a sizable production of fresh-water crawfish. An in-

creasing number of crawfish farms provide a reliable supply for the growing market for that item.

New York City

RELOCATION OF WHOLESALE FULTON FISH MARKET RECOMMENDED: Comprehensive studies on the relocation of the New York City Wholesale Fulton Fish Market were completed this past summer by that city's Department of Markets. A report on the studies calls for a new wholesale fish market at a cost of about $14.5 million to be located at Hunts Point, Bronx, on a site proposed as an expanded New York City Terminal Market which will also include a produce terminal and a meat distribution center.

The Mayor's Market Advisory Committee at New York City, after studying the Consultant's report on the Wholesale Fulton Fish Market, unanimoulsy approved the project stating that the interests of New York City, as a whole, would be served by the relocation of the existing Wholesale Fulton Fish Market from its present location to new facilities to be constructed by the city on a site large enough to consolidate, but not necessarily limit the markets involved.

The Consultant's report stated that "the Fulton Fish Market has been operating continuously at its present location on the East River, at the foot of Fulton Street for more than 140 years. Housed for the most part in old rundown buildings, there are now more than 90 dealers, wholesalers of fresh and frozen finfish and shellfish, processors and purveyors, located in the market area."

The Consultant's report brought out (1) the importance of fishery products receipts at the Wholesale Fulton Fish Market, (2) the importance of vessel fishery landings at New York City, and (3) that the annual per capita consumption of fishery products at New York City is relatively high--about 30 pounds per capita, or about three times more than the national per capita consumption.

Fig. 2 - A scene in the Fulton Fish Market area, New York City, showing the present congested conditions.

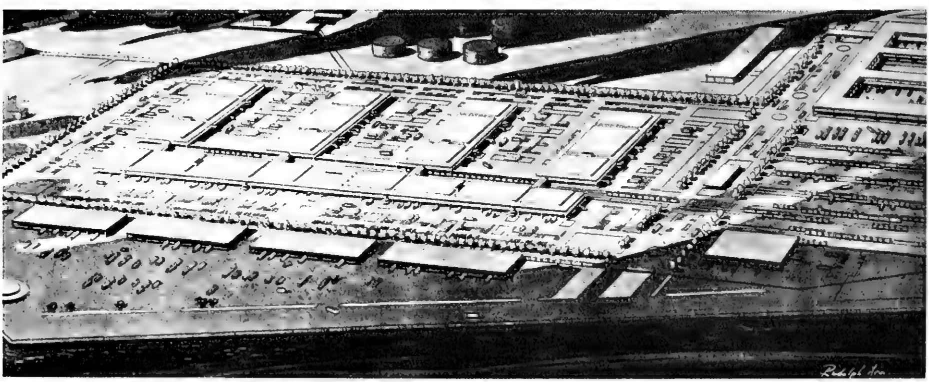


Fig. 1 - Proposed expanded New York City Terminal Market at Hunts Point, Bronx. At the right, is the produce terminal now under construction, with some of its buildings and the railroad team track area shown; in the middle, are the large buildings comprising a proposed meat distribution center, and at the lower left, in the shaded area is a suggested wholesale fish market.

Fig. 3 - A scene inside one of the Fulton Fish Market sheds.

In 1963, total receipts at New York City of fresh and frozen fishery products of both salt-water and fresh-water varieties amounted to 183 million pounds. In addition, 40 draggers in 1963 landed 335 trips at Fulton Fish Market piers with about 8 million pounds of fresh fish and shellfish, including scup (porgy) and sea scallop meats as the principal species.

In describing existing conditions at the Wholesale Fulton Fish Market, the Consultant's report concluded with, "Located astride South Street, a major north-south artery with thousands of vehicle movements daily, it is difficult for buyers to come and go freely. The rundown, unsanitary and inadequate market buildings are hardly attractive to discriminating buyers and certainly do not stimulate increased sales. Furthermore, our studies indicate that little, if anything, can be done to improve conditions at this location. It is in the best interests of the City and market users to relocate rather than rehabilitate."

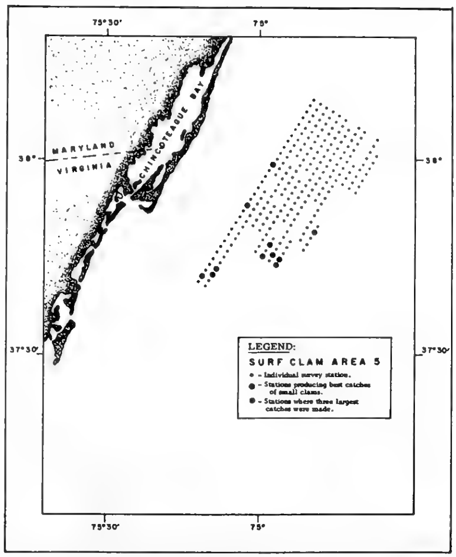
North Atlantic Fisheries Exploration and Gear Research

SURF CLAM SURVEY CONTINUED:
A survey of surf clam resources in certain waters off Maryland and Virginia was conducted in June and July 1964 by the U. S. Bureau of Commercial Fisheries research vessel Rorqual. The vessel was continuing an Atlantic surf clam survey begun in the summer of 1963. Survey work in 1963 was conducted in various areas extending from the south shore of Long Island, N. Y., to Maryland.

During June and July 1964, the Rorqual operated in waters off the Maryland and Virginia coasts (see chart). Working in the northern section of that area and following predetermined 1-mile grid lines, the vessel occupied 231 sampling stations. A 5-minute tow with a commercial (40-inch blade) jet dredge was made at each station.

Surf clams were taken in all but 2 of the 231 tows. The catch ranged up to 766 clams per tow (about ten 80-pound bushels). The size of the clams ranged from 0.75 to 7.25 inches in length, with most of them falling in the 5.75- to 6.50-inch size group. Considerable variation was noted both in the number of clams per tow and in the size composition. The 3 largest catches consisted of 184, 198, and 766 clams, having weights of 225, 242, and 781 pounds, respectively.

The surf clam is by far the predominant clam in the waters surveyed in Area 5. There are indications that the density of surf clams



Shows stations occupied in Area 5 and best catches during Rorqual surf clam survey in June-July 1964.

may increase as the survey extends to the south and east. The 3 best catches were made during the last 2 weeks of operation, while working in the more southern section of the survey area.

Surf clams were found to be most abundant in waters where the depths ran between 80 and 110 feet. The largest catch was made at a depth of 102 feet, with other good catches occurring in waters of about the same depth. No notably good catches were made in waters that were less than 80 feet deep, where the bottom was found to be generally much harder.

While running between stations, a clam sounder was usually kept in operation on the bottom. The instrument indicated that surf clams are distributed very extensively at varying densities in the sections between stations and that the species is very well established in the area surveyed.

The Rorqual was scheduled to resume the Atlantic surf clam survey in the fall of 1964.

Note: See Commercial Fisheries Review, November 1963 p. 28.

* * * * *

WHITING ESCAPEMENT STUDY:

M/V "Delaware" Cruise 64-5 (July 28-August 6, 1964): To study the size selectivity of two different sized otter trawl cod-ends on whiting (Merluccius bilinearis) was the objective of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware. The work was carried out in cooperation with the Bureau's Biological Laboratory, Woods Hole, Mass., as part of the studies of the International Commission for the Northwest Atlantic Fisheries.

During this cruise, vessel operations were carried out for the largest part of the time in areas where the commercial whiting fleet was trawling--off Cape Cod from Nauset Buoy to Chatham and in Cape Cod Bay. In addition, the vessel spent one day on Georges Bank southwest of Cultivator Shoals.

On this cruise, a 2-inch and a 3-inch mesh internal stretched mesh cod-end were interchanged on a nylon 60-80 whiting net rigged on the vessel's starboard side and a cotton net of the same design rigged on the port side. In addition, a 1-inch mesh nylon cover was affixed to the top of the 2-inch cod-end during a number of tows of the series.

Trawling was done in random sequences, changing the cod-ends and changing from port and starboard sides of the vessel after every 5 tows. A total of 60 tows was made in which sufficient whiting were taken to give valid information. Each tow lasted from 30 minutes up to one hour.

All fish caught on this cruise were counted and measured for length-frequency data, or where catches of a single species were large, a two-bushel subsample was measured. The fish escaping into the cover on the 2-inch cod-end were measured and recorded separately. Internal mesh measurements of the cod-ends and cover were taken at regular interval using an I. C. E. S. (International Council for Exploration of the Seas) mesh gauge.

Fig. 1 - 1-inch cover (A) over 2-inch cod-end (B).

Fig. 2 - Measuring mesh size with mesh gauge.

Data collected on this cruise has been turned over to the Bureau's Biological Laboratories for computer analysis and interpretation. Depending upon results, further studies may be continued aboard commercial fishing craft.

* * * * *

ELECTRICAL FISHING TESTS CONTINUED:

M/V "Delaware" Cruise 64-6 (August 17-28, 1964): Underwater observations were made of the action of fish in or near the effective range of an electric field by means of closed circuit underwater television during this 12-day cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware.

Observations during the cruise of fish actions and reactions to the net, without the electric field, are summarized as:

1. The fish do not seem to be panicked or even particularly frightened by a net.

2. At slow towing speeds, the fish swim along (a) in front of the net, (b) within the mouth of the net, or (c) into and out of the net.

3. At higher towing speeds, the fish swim along with the net, but at an increased rate; as towing continued at higher speeds, the fish swim more in the direction in which the net is towing and with less laterial movement. At accelerated swimming rates, the fish tend to drop back into the net with increased frequency as they become tired. Upon occasions, however, they increase their swimming rate in spurts in order to swim out of the net or its path. From time-to-time, fish could be observed going under or between the rollers at the higher towing speeds.

When the electric field was in use, the observed reaction of the fish to the field, in general, were as follows:

1. When within the effective range of the field, the fish were (a) quickly seized by muscular spasms which made swimming behavior ineffective; (b) the spasms were immediately followed by temporary paralysis; (c) if the field was quickly turned off, the fish could recover their swimming ability and escape before they went into the net; (d) if the field was kept on, deep stunning (narcosis) or death followed.

2. When captured by the field, the fish nearly always assumed a position above the bottom, nearly perpendicular to the bottom, with their heads in an upward position and with their belly forward and away from the net.

3. In this stunned and floating position, the fish were overtaken and scooped up by the net.

4. Although the smaller fish usually swam higher off the bottom (when distributed by the net) than the larger fish, they were affected by the field at approximately the same distance from the anode; the strength of the field in front of the anode (where the larger fish were affected) was probably not as great as it was where the smaller fish were taken (the latter were nearer to a vertical position above the anode).

5. At the leading edge of the effective field, the fish were less affected while swimming directly away from the anode than when they attempted lateral movement; this may have been due to a decrease in the distance from the electrode rather than to the directional force of the electrical field.

Power was transmitted to two underwater pulse transformers on the trawl net. Pulse rates of 60 per second (30 per transformer) and 40 per second (20 per transformer) were used during the trials. Total power used ranged from about 18 kw. to 34 kw. with 26.25 kw. used most of the time.

During the cruise, some 4,000 feet of 16 millimeter movie film was exposed in an effort to obtain a permanent record of activities viewed by the underwater TV camera. In addition, a limited footage was taken of the electrical equipment in use.

The species of fish observed included: haddock, cod, halibut, wolffish, dogfish, skate, flounder and sole, and a number of other unidentified fish. The unidentified fish were thought to include either herring or bluebacks and whiting or hake. The film records were made mostly on dogfish, small haddock, and flounder and sole.

Areas (1) in Cape Cod Bay, (2) off of Nausett Beach, (3) at the Southeast Part of Georges

Bank, (4) at the Bight of Clarks on Georges, (5) on Stellwagen Bank, and (6) in Ipswich Bay, were utilized during the cruise in search of unclouded water. Depths ranging from 6 to 32 fathoms were fished in the effort to find fish, good bottom, sufficient light and clear water, all of which were required for making good films.

Artificial illumination was used at times with little if any effect on the fish; neither a scare effect nor an appreciable attraction to the light was apparent.

The maximum limits of visibility encountered during the cruise were about 20 feet near the surface and 12 to 14 feet at the bottom in front of the net being towed.

Note: See Commercial Fisheries Review, September 1964 p. 30; June 1964 p. 20; January 1964 p. 21.

North Atlantic Fisheries Investigations

SUMMER DISTRIBUTION AND ABUNDANCE OF GROUNDFISH SPECIES STUDIED:

M/V "Albatross IV" Cruise 64-10 (Part I July 27-August 11; Part II August 6-22, 1964): To determine the summer distribution and relative abundance of groundfish species from

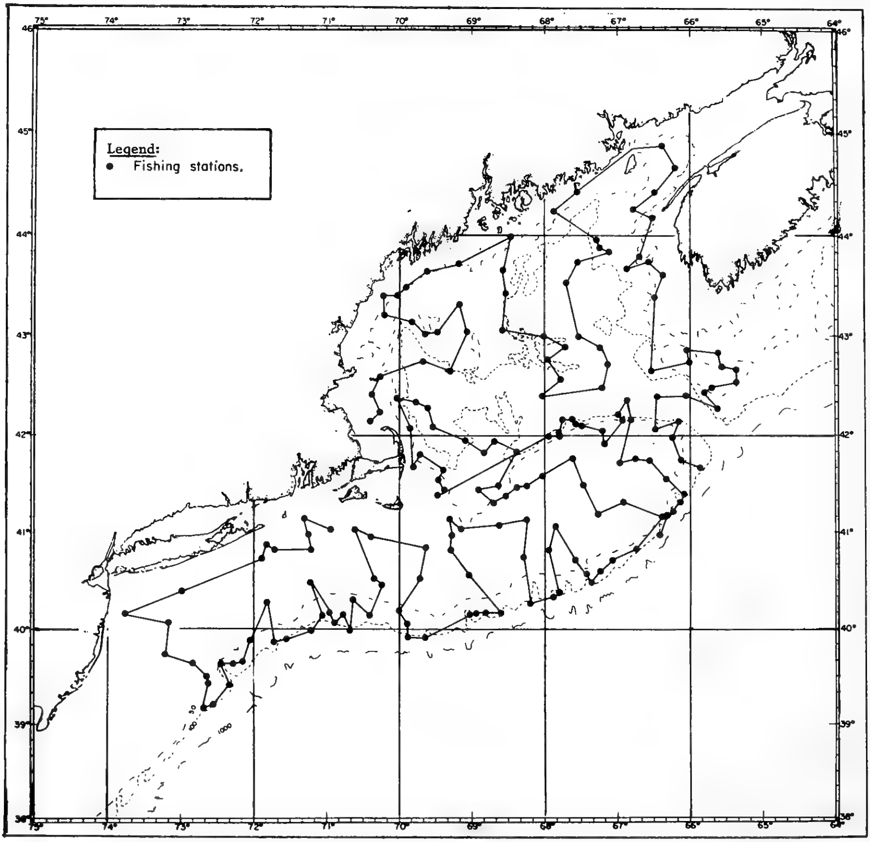


Fig. 1 - Shows fishing stations worked during Albatross IV Cruise 64-10, July 27-August 22, 1964.

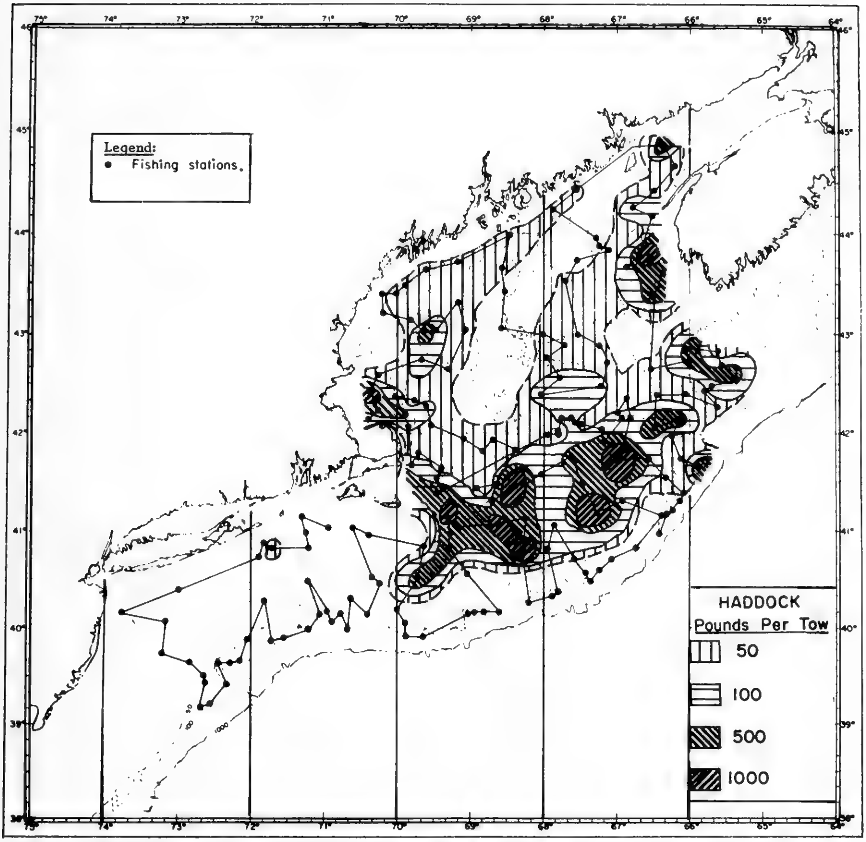


Fig. 2 - Shows amount of haddock taken per tow during Albatross IV Cruise 64-10, July 27-August 22, 1964.

the Bay of Fundy southward to Hudson Canyon was the purpose of this survey by the U. S. Bureau of Commercial Fisheries research vessel Albatross IV.

A total of 180 groundfish survey stations were made on this cruise. All fish were identified and measured, and the total weight by species was obtained from each tow. Stomach contents of 1,781 fish were examined and recorded from 41 species caught throughout the study area. Scale samples were taken from 1,262 haddock and 539 yellowtail flounders. Otoliths were extracted from 380 whiting (silver hake) and 179 butterfish. Also, a sample of sea herring was collected and frozen for the Bureau's Biological Laboratory at Boothbay Harbor, Maine. Samples of red and white hake were frozen for further studies on the life history of those species.

Large quantities of small haddock between 15-30 centimeters (6 to 12 inches) long were caught on Georges Bank in depths between 30 to 50 fathoms. Those were one-plus year old fish originally reported after the 1963 summer and fall groundfish survey Albatross IV (Cruise 63-5). Catches of this year's (1964) year-class of haddock were low. They were absent from some areas where they were a-

bundant the previous summer. This may be due to either relatively poor recruitment or simply indicate that the small haddock were not available as yet to the type gear used. No forecast of the strength of this year-class can be made until the completion of the fall survey.

Whiting were found abundant along the western side of Georges Bank and along the Maine coast.

The *Albatross IV* has proven to be an unusually stable research platform. For the first time, the catch was weighed on a species basis. A beam balance was used throughout with complete success.

The total weight of all fish and squid caught on this cruise amounted to 49,000 pounds. Haddock (all sizes combined) totaled 21,100 pounds and was distributed as shown in figure 2 (43 percent of the total catch), while 3,500 pounds of cod and 3,200 pounds of spiny dogfish were caught. The balance was divided among 46 other species.

Observations Noted During Cruise 64-10: Some interesting observations were made during the North Atlantic fishery survey Cruise 64-10 by the research vessel *Albatross IV*.

Cod and haddock spawn in late winter and early spring. This past August a female haddock was caught off Nova Scotia that appeared ready to spawn. A male cod taken off Massachusetts was fully ripe and running. While off Nova Scotia the *Albatross IV* communicated with the Lurcher Shoal Lightship personnel and they mentioned that this was an unusually cold year and that August in particular was very cold. A 64-pound halibut was found to have eaten a large (over 2 feet long) dogfish. Halibut are voracious feeders, frequently eating big lobsters and large crabs, but the dogfish was a surprise. As anticipated, yearling haddock were unusually abundant. The incoming year-class of haddock was not in evidence during August and any prediction of its strength can not be made until completion of the fall survey cruise. Young haddock are not necessarily on the bottom in August.

Surveying marine fish abundance with the otter trawl is as yet the only feasible technique. The Bureau's Woods Hole Biological Laboratory is continually investigating other techniques in an effort both to increase survey efficiency and to improve the quality of data collected. Growing out of the experience gained in using television, a towable still camera was being tested. The camera may be towed through the water at high speed at scheduled depths and takes pictures at predetermined intervals. The camera mechanism and strob light are automatically controlled.

Note: See *Commercial Fisheries Review*, Sept. 1963 p. 37.

* * * * *

CONTINENTAL SHELF WATERS SURVEYED:

M/V "Albatross IV" Cruise 64-11 (August 31-September 13, 1964): To conduct an environmental survey of Continental Shelf waters in the area bounded by longitudes 64° W. and 72° W. was the objective of this cruise by the research vessel *Albatross IV*.

During the cruise a total of 74 hydrographic stations were occupied throughout the area. Water samples were obtained at depths of 1, 10, 20, 30, 40, 50, 75, 100, 150, 200, 300, 500, 750, and 1,000 meters to determine temperature, salinity, dissolved oxygen, and chlorophyll. In addition, 24 hydrographic stations were occupied at 2-hour intervals at a moored buoy in the South Channel area to determine the temporal fluctuations of those properties, and of zooplankton biomass due to tidal oscillations and internal waves.

North Pacific Fisheries Explorations and Gear Development

SURVEY OF DEEP-WATER MARINE FAUNA OFF MOUTH OF COLUMBIA RIVER CONTINUED:

M/V "Commando" Cruise 11 (August 31-September 17, 1964): The objectives of this cruise on a predetermined trackline southwest of the Columbia River were to: (1) compare the sampling efficiency for demersal fauna of a 70-foot semiballoon shrimp trawl and a 400-mesh eastern otter trawl, (2) collect faunal samples for the U. S. Bureau of Commercial Fisheries Technological Laboratory at Seattle, Wash., and for radiological analysis by the Laboratory of Radiation Biology, University of Washington, and (3) take cores of the substrate for heteroptrophic marine bacteria studies.

This cruise by the exploratory fishing vessel *Commando* was the 15th in a series con-

ducted by the U. S. Bureau of Commercial Fisheries in cooperation with the Atomic Energy Commission (AEC).

The 70-foot semiballoon shrimp trawl was fished with V-type doors weighing about 850 pounds each on a single warp using 25-fathom bridles. Four 8-inch aluminum trawl floats were attached to the headrope. The 400-mesh eastern trawl was fished using double warps with 50-fathom dandylines and the 850-pound V-type doors. The headrope was buoyed with eleven 8-inch aluminum trawl floats, and a $1\frac{1}{2}$-inch mesh liner was placed in the cod end.

Fishing was conducted in 50 and 100 fathoms in accordance with a randomized sampling design. A total of 8 half-hour tows was made with each gear in each of the two depths making a grand total of 32 drags throughout the experiment. Five additional drags were made at the 50- and 400-fathom stations with the shrimp trawl to obtain samples for radiological analysis.

Marked differences were found in the fish and shrimp-catching abilities of the two different types of gear. Although the effective width opening of the shrimp trawl is less than that of the 400-mesh trawl, the shrimp trawl caught 10 to 15 times more shrimp. Conversely, the 400-mesh trawl caught fish at a rate 10 to 15 times greater than that of the shrimp trawl. The species and size composition of the catches also differed between gear.

Hake, immature sablefish (black cod), and pink shrimp (Pandalus jordani) dominated the catches in 50 fathoms while rockfish (Sebastodes sp.), Dover sole, and rex sole were the most common forms in 100 fathoms. Eight tagged Dover sole (5 in 50 fathoms and 3 in 100 fathoms), which had been tagged and released on the trackline by personnel of the Oregon Fish Commission on previous cooperative Bureau-AEC cruises, were recovered.

Samples of fish and invertebrates were collected and frozen for the Laboratory of Radiation Biology of the University of Washington. Additional samples were collected for the Bureau's Technological Laboratory in Seattle.

A total of 10 cores was taken at 50, 300, and 850 fathoms for heterotrophic marine bacteria studies by personnel from the College of Fisheries, University of Washington.

Note: See Commercial Fisheries Review, April 1964 p. 25; January 1964 p. 23.

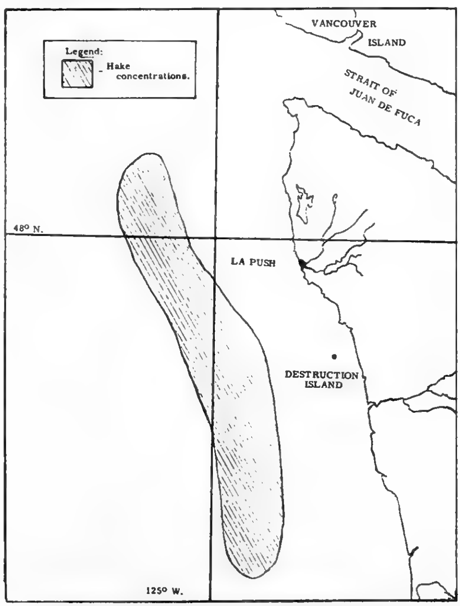
* * * * *

EXPERIMENTAL FISHING WITH "COBB" PELAGIC TRAWL:

M/V "St. Michael" Cruise 2 (May-July 1964): The objectives of this 12-week cruise by the vessel St. Michael, chartered and operated by the U. S. Bureau of Commercial Fisheries as an exploratory fishing vessel, were to: (1) evaluate the commercial potential of the "Cobb" pelagic trawl on known concentrations of midwater fish and (2) test heavy-duty electrical towing cable and depth-temperature recording instruments.

The vessel St. Michael, a 72-foot trawler, carries a crew of 4, is powered with a 353 hp. Diesel engine and mounts a trawl-net reel. The reel facilitates setting and retrieving the net, especially in high winds and rough seas.

On this experimental cruise, large concentrations of hake were found off the Wash-



Shows area of operations during St. Michael Cruise 2.

ington coast between Destruction Island and the Umatilla light-ship. Hake schools, as defined by a high sensitivity white-line echo-sounder, were located from the bottom up to 20 fathoms above the bottom.

Following initial good catches of hake off Washington, the net was fished on commercial fishing grounds in Queen Charlotte Sound off British Columbia, in an attempt to produce large quantities of Pacific ocean perch. Ocean perch catches, however, did not exceed 6,000 pounds an hour. One two-week period was devoted to operations during hours of darkness. Extensive soundings were taken during that period without locating off-bottom fish schools. Poor weather hampered each phase of the cruise and reduced time available for night fishing.

In the later part of the cruise, testing of the gear on known hake concentrations was resumed off Washington where numerous large hake catches were made. The largest single catch was 50,000 pounds in 90 minutes; the highest catch rate was 30,000 pounds taken in 30 minutes of fishing time. Catches in excess of 15,000 pounds in 30 minutes were common.

A total of 56 drags was made using the following three modifications of the "Cobb" pelagic trawl: (1) constructed entirely of conventional 3" nylon web, (2) constructed of conventional 3" nylon web with 6" mesh in the wings, and (3) constructed entirely of 3" monofilament nylon web. Each net was similarly rigged with 41 eight-inch Phillips trawl floats equally spaced along the head rope. Lead lines consisted of two 5-fathom sections of $\frac{3}{8}$" chains, attached to the wind sections of the footrope. Cable scope to net depth ratio was about 3.5 to 1, decreasing as depth increased.

The electrical trawl cables functioned well during the cruise. Several mechanical failures occurred in the telemetering components but were satisfactorily corrected. Telemeter malfunctions usually resulted in poor catches due to an inability to properly position the net at depths where fish were concentrated. Sensing units were located at each trawl door except for a short period when one was placed on the footrope. From differential readings between the two units it was determined that the footrope was positioned about two fathoms deeper than the doors. Also, the net appeared to bank much like an airplane when the vessel turned. Underwater observations made of the nets prior to the cruise indicated the net opening to be about 60 feet square.

Overall results of the cruise were encouraging and all major components operated as designed. Minor additional changes should make the gear suitable for commercial fishing.

Oceanography

LARVAL SPECIMENS OF TUNA, SWORDFISH, AND MARLIN COLLECTED IN THE TROPICAL ATLANTIC:

The collection of larval forms of large pelagic fish was a primary objective of a 21-day cruise (July 24-August 14, 1964) to Bermuda, the Sargasso Sea, and the northeastern Bahamas by the research vessel John Elliott Pillsbury (owned and operated by the Institute of Marine Science, University of Miami). The cruise was sponsored by the National Science Foundation.

Hundreds of larval tuna were taken during the cruise to form one of the most extensive collections of young tuna ever assembled. Other larval specimens taken included white marlin and blue marlin about $\frac{1}{8}$-inch in length, broadbill swordfish as small as $\frac{1}{4}$-inch in length, and many dolphin, barracuda, and gaint ocean sunfish. The tiny marine specimens will help scientists trace the life his-

Fig. 1 - Research vessel John Elliott Pillsbury departs on an oceanographic cruise to the Tropical Atlantic.

Fig. 2 - Working deck of the research vessel John Elliott Pillsbury.

tories, migration patterns, and spawning locations of large pelagic fish.

Plankton collections during the cruise indicate that the major spawning grounds of marlin are located southwest of Bermuda and in the northeast and northwest Bahamas, according to the scientist who directed sampling work aboard the Pillsbury.

In addition to the collection of larval fish, general sampling was carried out with midwater trawls, bottom trawls, and bottom dredges from depths of 3,000 to 6,000 feet. Wire cable up to four miles in length was required on some of the deep-water hauls. Night-light fishing techniques were used to capture lanternfish, dolphin, flyingfish, squid, octopus, and other marine animals.

One interesting catch was a perfectly formed sailfish only $1\frac{1}{2}$ inches long taken in a midwater trawl, and it came aboard alive

Fig. 3 - Putting over a high-speed plankton sampler which can be towed at 8 knots, thereby capturing fast-swimming organisms that avoid regular plankton nets (which are towed at slower speed).

and in good condition. Placed immediately in one of the aquaria maintained on the vessel for photography of live specimens, the little fish swam about vigorously for more than an hour with its miniature sail held erect. Color motion pictures were made of the swimming sailfish for behavior studies.

Many deep-water specimens were captured alive and photographed, including the unusual Argonaut, the octopod that lives in a paper nautilus shell. While being photographed in an aquarium, one Argonaut gave birth to hundreds of microscopic baby Argonauts, complete with pearly, transparent shells less than a millimeter in diameter.

Another unusual catch during the cruise was a deep-water anglerfish which came up alive with its fragile "fishing lure" intact. Before it died, movies were made of the strange fish swimming in an aquarium.

The Pillsbury left Miami on July 24, 1964, and began its scientific collecting on the east-

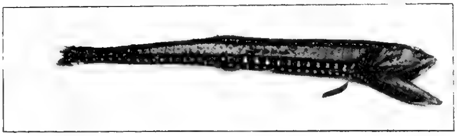


Fig. 4 - Shows an unusual specimen (a Gonostomatid) collected by the research vessel John Elliott Pillsbury. This deep-water fish, only a few inches in length, was captured at a depth of about 4,000 feet. Note the light organs along the underside of the fish.

ern edge of the Gulf Stream near Grand Bahama Island. Then the vessel worked its way north to a point off Charleston, S. C., where she swung east to Bermuda. After two days of inshore and coral reef collecting at Bermuda, the vessel proceeded northeast to a large seamount. Activities were curtailed, however, by gale winds so the Pillsbury moved south to calmer waters. After working off Abaco and around the northern edge of the Little Bahama Bank, the research vessel returned to Miami, Fla., on August 14, 1964.

The Pillsbury left Miami again on August 20, 1964, for an oceanographic cruise to the Caribbean. (Institute of Marine Science, University of Miami, August 19, 1964.)

* * * * *

EXCHANGE VISITS BY UNITED STATES AND SOVIET OCEANOGRAPHERS:

Six United States oceanographers began a 4-week tour of the Soviet Union on September 14, 1964, as part of an exchange program that will bring a similar delegation of Soviet oceanographers to the United States. This will be the first exchange of oceanographers between the two countries.

The schedule of the United States group called for them to visit 13 Soviet oceanographic installations as well as the Soviet oceanographic vessel Mikhial Lomonosov. Individual visits to an oceanographic submarine, a geochemistry institution, and the Soviet Naval Hydrographic Office were also planned. The tour will take the United States oceanographic delegation to Moscow, Yalta, Gelendzhik, Sevastopol, Leningrad, and Murmansk.

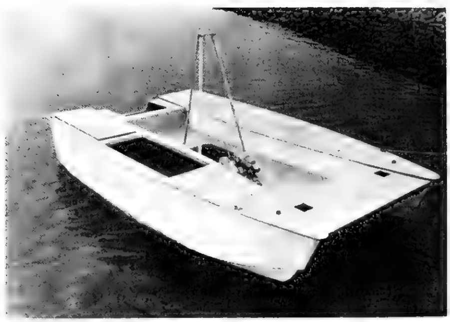
The exchange visits by United States and Soviet oceanographers are sponsored by the Coast and Geodetic Survey, U. S. Department of Commerce.

* * * * *

SMALL PORTABLE MARINE WORK PLATFORM WITH DERRICK:

A small marine work platform known as the "Hydro-Cat" has been developed by a firm in California. According to its designers, the 18-foot craft with a $10\frac{1}{2}$-foot beam is intended to serve as a stable work platform specifically for use by oceanographers and limnologists.

Fig. 1 - Shows Hydro-Cat under construction.



Figs. 2 - Shows completed Hydro-Cat in the water.

Its features include a center-located demountable derrick and instrument hatch for convenient lowering of instruments; ballast tanks for rough-weather work; and forepeak and afterpeak collision bulkheads. It can be powered by any outboard motor from 25 to 100 horsepower. The "Hydro-Cat" can be quickly broken down to two hulls and a center section to facilitate transport.

Oregon

METOLIUS SALMON HATCHERY CLOSES AND EXPERIMENTAL HATCHERY STATION OPENS:

The closure on July 31, 1964, of the Metolius River Salmon Hatchery above Pelton Dam was announced by the Oregon Fish Commission in early August 1964. At the same time the Commission announced plans to open a test hatchery unit below Pelton Dam by September 15, 1964.

The Metolius hatchery, located on Spring Creek (a Metolius tributary) some 30 miles above the Pelton-Round Butte dam complex, was established in 1947. Its purpose was to compensate partially for losses of spawning and rearing areas on the Columbia River and tributaries as a result of dam construction.

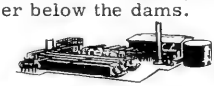
Factors leading to the closure of the Metolius hatchery were the station's limited facilities, difficulties in passing both upstream and downstream migrant salmon over the Pelton-Round Butte dam complex, and low water temperatures in the area, all of which contributed to the relatively high cost of the fish reared to release size at the hatchery. During earlier phases of the Metolius operation, both sockeye and spring chinook salmon were handled at the station but in later seasons efforts were concentrated on spring chinook.

The closure of the Metolius station, however, does not mean the end of hatchery operations in the area. Plans call for an investigation of the potential for artificial propagation of spring chinook, steelhead, and possible other species at the site of the new test hatchery unit immediately below the re-regulating dam at Pelton. The new experimental operation will consist of hatching spring chinook and steelhead eggs from fish taken either from the Deschutes or from the Willamette River system, and rearing the resultant fingerlings for a full year.

Water to operate the test facility will be taken from the forebay of the re-regulating dam, which offers water suitable in quality and temperature for fish cultural purposes. Water temperatures at the dam range between 40^{o}-60^{o} F. The river flow below the re-regulating dam averages some 3,000 cubic feet per second, which is far above the pilot station's requirements and would be more than adequate for a hatchery with a capacity of $1\frac{1}{2}$ million yearling salmon.

The cost of the small pilot station is reported to be about $10,000 for construction plus an additional $10,000 for equipment and operating expenses during the first year. Expansion of the experimental project to a full-scale production facility, if such course appears feasible, will be much more expensive. A station with a rearing capacity of a million yearling chinook, for example, could be expected to cost $350,000 or more. About half of the money needed for the pilot station is being provided by the electric company which owns the Pelton-Round Butte dam complex.

The Oregon Fish Commission described the closing of the Metolius station and establishment of the pilot hatchery below Pelton Dam as an effort to modernize or replace outmoded facilities. It was pointed out that the Oregon spring chinook hatchery program in the Willamette River system has been highly successful during recent years giving rise to considerable optimism that a successful spring chinook program could be developed on the Deschutes River below the dams.



Oysters

LIGHT STRIKE IN JAMES RIVER SEED BEDS IN 1964:

A light set of oysters in the James River seed area occurred during the first two weeks of September 1964, according to scientists at the Virginia Institute of Marine Science, Gloucester Point, Va. The head of oyster research at the Institute reported that after intensive surveys it is now known that a "light" strike began during the last four days of August and continued with decreasing intensity through September 8.

The Institute scientist said, "The distribution of spatfall this summer was most peculiar. Strings of test shells indicated that spatfall was heaviest on upriver inshore areas. This suggests that the oyster larvae originated from oysters in the seed area rather than from downriver oysters. It is my belief that in normal years most larvae originating in shallow inshore waters are carried downstream and lost."

A check of natural cultch (shell) collected from seed beds in the upper James River was made on September 11. Microscopic examinations of those shells revealed that some spat had collected on all beds from Wreck Shoal to Deep Water Shoal on both sides of the

river, substantiating the observations on test shells put out by the Institute. The scientist emphasized that spat observed on September 11 were very small. Most of those found were about $\frac{1}{25}$th of an inch across and would require a good magnifying glass to be seen readily. He noted that such small spat usually survive very well in the upper river.

Although the 1964 spatfall appears to be quite light in comparison with long-term records from the James River, it will probably be an improvement over the past three years. The upriver location of this spatfall is particularly beneficial because of complete failure there in recent years.

The Institute's oyster research scientist pointed out that quality of cultch often influences the intensity of setting and survival. "We always use clean shells for our weekly test strings in the river," he noted, "But natural cultch varies greatly in quality. The cultch in the upper seed beds this year is fouled with a coat of 'moss animals,' whereas the shells in the middle river beds are cleaner except for some sea squirts. Unfortunately, most of the inshore beds lack cultch and what little is there is badly fouled with sea squirts. The number of spat surviving will be influenced by those factors."

State shell plantings of 1963/64 in the middle of the seed area are reasonably clean of fouling organisms, but are located somewhat downriver from the best of the 1964 spatfall. The location of the State shell plantings was based upon setting records from past years which indicate that normally the best set occurs on the downriver and channelward seed rocks.

From records accumulated over the past 20 years, the scientist indicated that the normal setting season continues until the first of October, but oysters were now spawned out and it was unlikely that much more setting would occur this year. When summer temperatures prevail, free-swimming larvae require a period of 10 to 12 days before setting. The Institute scientist feels that the effect of tropical storms with their high tides is probably harmful to broods of oyster larvae since they are likely to be carried out of the river.

The Director of the Virginia Institute of Marine Science pointed out that this latest information on oyster setting is a direct result of the increased attention being given to James estuary under the Institute's Operation James River which is a study of the physical and biological characteristics of the system. He further said that more careful studies of the setting of oysters and other important larvae are being planned for the 1965 field season.

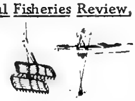
* * * * *

DEVELOPMENT OF DISEASE-RESISTANT OYSTER STRAINS:

Studies on the development of disease-resistant strains of oysters were recently started at Rutgers University in New Jersey; the Virginia Institute of Marine Science, Gloucester Point, Va; Natural Resources Institute of the University of Maryland, Solomons, Md.; University of Delaware Marine Laboratory, Newark, Del. The studies are part of the program under Public Law 87-580 and are being conducted with funds administered by the U. S. Bureau of Commercial Fisheries to determine the resistance of various oyster stocks to MSX mortality.

The Bureau's Milford (Conn.) Biological Laboratory is cooperating in this program by (1) supplying conditioned oyster spawners of Long Island Sound origin; (2) conditioning Chesapeake Bay oysters for comparative studies and spawning; and (3) rearing larvae of presumed resistant stocks for testing of juvenile oysters to MSX exposure at various mid-Atlantic locations. This also involves sending starter cultures of a number of species of algae to both State laboratories to provide food for the larval and juvenile oysters.

Note: See Commercial Fisheries Review, September 1964 p. 36.



Pesticides

STRINGENT RULES ORDERED IN USE OF PESTICIDES ON LANDS ADMINISTERED BY DEPARTMENT OF THE INTERIOR:

The issuance of stringent rules regarding use of pesticides on the more than 550 million acres of public lands administered by the Department of the Interior was announced by Secretary Stewart L. Udall, September 4, 1964. The rules were developed after an earlier secretarial directive that the Department's standards should set an example for all others to follow. The new guidelines, which apply to all Interior programs for the

control of pest plants and animals, were developed by Frank P. Briggs, Assistant Secretary for Fish and Wildlife.

The order directs that first priority be given to nonchemical methods in pest control. When chemicals are deemed necessary, safety will be the main consideration. Secretary Udall said, "Prior to the use of pesticides, there must be a determination of anticipated results and possible harmful effects. Only chemicals registered for use on a particular pest may be employed, and instructions for use must be carefully followed. It is of the utmost importance that the proposed controls be limited to the target area to avoid contaminating lakes, streams, fish and wildlife, or adversely affecting other interests in the community."

Secretary Udall directed Interior agencies to inform state and local authorities, if their interests are involved, when proposed Interior pest-control activities are to be conducted. He directed that state and local laws be complied with in such programs.

The guidelines require the use of the most selective chemicals available, minimum dosages with the safest carriers, and application under conditions that leave no reasonable doubt that harmful effects will be minimized. Interior agencies were told to avoid using compounds which are known to concentrate in living organisms, such as DDT, chlordane, dieldrin, and endrin.

Secretary Udall warned that even some of the comparatively safe pesticides, such as malathion, pose hazards to some sensitive species of fish, food organisms, and beneficial insects. He said particular care must be taken to avoid injury to pollenizing insects. He said that while the acute toxic effects of most herbicides are minimal for birds and mammals, the chronic effects are largely unknown. And he noted that some herbicides are highly toxic to fish food organisms. The order requires that advice be obtained from fish and game and health officials before there is any extensive field use of herbicides in close proximity to water areas.

Secretary Udall said that results of chemical pest-control programs carried out by Interior agencies must be appraised by specialists to assure minimum adverse side effects. He thus assigned to the Geological Survey the responsibility of surveillance and study of pesticide effects on water resources of the Department's areas. The Bureau of Sport Fisheries and Wildlife will appraise the effects on fish and wildlife and their food organisms.

Secretary Udall further ordered that all chemical pest-control programs planned by Interior agencies be first reviewed by the Geological Survey, the Bureau of Commercial Fisheries, and the Bureau of Sport Fisheries and Wildlife. The proposed programs then will be forwarded to the Federal Committee on Pest Control, made up of representatives of the Departments of Interior, Agriculture, Defense, and Health, Education, and Welfare. The Federal Committee reviews all chemical control programs that are financed wholly or in part with Federal funds, or are directed or supervised by a Federal agency. Interior's representatives on the Committee are Robert M. Paul, Deputy Assistant Secretary for Fish and Wildlife, and Lansing A. Parker, Associate Director, Bureau of Sport Fisheries and Wildlife.

Secretary Udall said Interior agencies not directly engaged in chemical pest-control programs are required to observe and report any significant contamination of residual accumulations caused by pesticides which may affect the Department's interests.

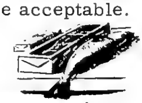
Preservation

SHELF LIFE OF FROZEN FISH STUDIED: Freezing is one of the most important commercial methods of preserving fishery products. Since it is known that freezing does not improve the quality of any fishery product above its original quality, the recommendation is always made that only initially high-quality fish should be frozen. Recommendations concerning subsequent frozen storage are more difficult to make, since there is a general lack of information on the combined effects of time of storage in ice prior to freezing and the effects of different constant freezer temperatures upon the frozen storage life of fishery products. The Gloucester (Mass.) Technological Laboratory, U. S. Bureau of Commercial Fisheries, has undertaken a project in which the effects of those variables are being studied.

The first fish species studied was pollock--a fish generally in plentiful supply. Eviscerated pollock, stored in ice at the Bureau's

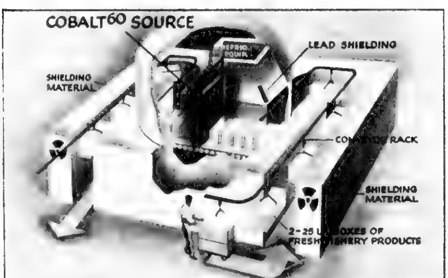
laboratory, was filleted on the 1st, 3rd, 6th, 9th, 13th, and 16th day of ice storage. They were then packaged in commercial type one-pound fillet cartons and in $13\frac{1}{2}$-pound blocks and were frozen in a plate freezer. Frozen one-pound fillet packages were stored at +20° , +10° , 0° , -10° and -30° F., and the blocks at 0° F.

Those products were being tested for acceptance this past summer by organoleptically evaluating them along with freshly frozen controls. The one-pound fillets were tested as a steam-cooked product and the blocks as fried portions. Preliminary results showed average storage life of +10° and +20° F. stored pollock fillets to be 8 and 4 weeks, respectively. Fillets stored at 0° F. reached a stage of borderline acceptance in 15 to 17 weeks' storage. The main causes of quality loss in those products have been discoloration and rancidity. Fried portions made from blocks held in storage up to 22 weeks were found to be acceptable.



Radiation Preservation

ACCEPTANCE TESTS CONDUCTED FOR PETRALE SOLE FILLETS: Large-scale acceptance tests on radiation-pasteurized petrale sole fillets at Fort Lee, Va., were conducted on September 18 and 25, 1964, by the Seattle Technological Laboratory of the U. S. Bureau of Commercial Fisheries. On both of those days, 300 servings of fish fillets irradiated at 0.3 megarad and 300 servings of unirradiated (control) fillets were judged for acceptability



Sketch of irradiator pilot plant in Gloucester, Mass., adjacent to the U. S. Bureau of Commercial Fisheries Technological Laboratory. The irradiator is a $600,000 Atomic Energy Commission facility to show how the shelf life of fresh marine products may be extended.

using the 9-point hedonic scale. That rating scale reflects varying degrees of "likes" and "dislikes": 9 for "like extremely well" to 1 for "dislike extremely." The test samples were included as part of a regular meal to Army volunteers at Fort Lee. At the time of the tests, the irradiated fish fillet samples had been stored at about 33° F. for 3 and 4 weeks.

Prior to the scheduling of the tests, petrale sole fillets were obtained from three different commercial fish-filleting plants, vaccuum-packed in No. 10 cans, and irradiated at 0.3 megarad. Those samples were frozen and shipped to the U. S. Army Research Laboratories at Natick, Mass., for toxicity tests and to obtain clearance for the Fort Lee tests.

Similar preference tests had been previously conducted at the Seattle laboratory on irradiated petrale sole fillets. The irradiated samples received preference scores that were generally in the same range as those given to the unirradiated samples.

* * * * *

IRRADIATION OF FISH AT SEA PLANNED: The construction by the Atomic Energy Commission (AEC) of a portable cobalt-60 research irradiator which can be used aboard fishing vessels was near completion this past September. This 14-ton irradiator charged with 25,000 curies of cobalt 60 will be capable of processing about 100 pounds of fish an hour at a level of 150,000 rads. Much of the quality loss in fishery products occurs after the fish are caught and before they are landed at the dock. Irradiation at sea will improve the general quality of landed fish whether it is to be sold fresh, frozen, or reirradiated for even further fresh shelf-life extension. In an effort to carry out research in this area, AEC is planning to make this irradiator available to the U. S. Bureau of Commercial Fisheries for use aboard its exploratory fishing vessel Delaware, which operates out of Gloucester, Mass. When the irradiator is installed aboard the vessel, research will be carried out at sea to provide a basis for evaluating the potential of irradiation at sea.

Notes: Rad = The quantity of ionizing radiation which results in the absorption of 100 ergs per gram of irradiated material at the point of interest.
Erg = Unit of energy.
See Commercial Fisheries Review, October 1964 p. 35; September 1963 p. 33.

Shrimp

UNITED STATES SHRIMP SUPPLY INDICATORS, SEPTEMBER 1964:

Item and Period	1964	1963	1962	1961	1960
	. . . (1,000 Lbs. Heads-Off) . . .				
Total landings, So. Atl. and Gulf States:					
November	-	13,250	12,177	9,996	14,455
October	-	22,022	15,254	12,696	21,688
September	13,200	18,045	13,012	9,691	18,832
August	15,299	19,769	12,340	10,944	20,441
January-July	53,269	55,675	44,441	41,530	58,521
January-December	-	138,254	105,839	91,395	141,035
Quantity canned, Gulf States 1/:					
November	-	2,495	3,028	2,175	1,535
October	-	4,242	4,054	2,065	2,480
September	1,200	3,697	1,759	598	2,222
August	1,560	3,121	1,355	1,090	4,427
January-July	8,496	13,738	11,089	7,756	14,836
January-December	-	28,468	23,322	14,500	26,394
Frozen inventories (as of end of each mo.) 2/:					
November 30	-	42,142	27,500	20,668	37,264
October 31	-	37,418	21,315	17,811	31,209
September 30	-	27,356	12,843	13,361	24,492
August 31	21,952	24,803	12,754	12,728	20,171
July 31	24,315	25,460	13,677	14,849	17,397
June 30	25,546	24,047	13,796	19,416	15,338
May 31	28,082	24,053	13,904	24,696	17,540
Imports 3/:					
November	-	14,759	17,964	14,852	13,516
October	-	20,153	18,279	16,813	14,211
September	-	10,236	9,696	8,629	8,190
August	-	8,598	7,381	6,743	6,407
January-July	82,330	81,487	72,065	63,803	58,684
January-December	-	151,530	141,103	126,268	113,418
	. . .(¢/lb., 26-30 Count, Heads-Off). . .				
Ex-vessel price, all species, So. Atl. and Gulf Ports:					
November	-	52.3	84.5	73.5	54.0
October	-	53.3	90.0	68.7	53.0
September	4/60-70	57.9	90.9	70.1	52.2
August	4/60-73	59.0	83.6	66.1	52.0
July	4/62-72	63.5	82.1	55.8	54.6
June	66.0	77.0	84.4	53.7	64.1
May	61.1	80.9	83.7	52.8	62.9
April	60.0	83.6	82.2	55.4	60.6
Wholesale price, froz. brown (5-lb. pkg.), Chicago, Ill.:					
November	-	71-78	105-110	89-92	69-73
October	-	67-75	108-115	83-90	69-73
September	79-83	73-77	113-118	87-90	65-70
August	78-84	75-81	110-112	76-91	64-67
July	80-85	77-97	-	70-75	72-77
June	80-85	95-102	102-104	67-72	76-77
May	72-83	100-103	96-103	67-69	74-77
April	72-74	100-105	94-97	69-70	74-75

1/Pounds of headless shrimp determined by multiplying the number of standard cases by 30.3
2/Raw headless only; excludes breaded, peeled and deveined, etc.
3/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
4/Range in prices at Tampa, Fla.; Morgan City, La., area; Port Isabel and Brownsville, Tex., only.
Note: September 1964 landings and quantity used for canning estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, JULY-SEPTEMBER 1964:

A report on the progress of biological research by the Bears Bluff Laboratories, Wadmalaw Island, S. C., for July-September 1964, follows:

Oyster Studies: Shortly after the beginning of the quarter, additional experiments were started on the feeding of oysters with carbohydrates. As in the other experiments, 125 uniform size oysters were put in each of a pair of 12 x 12-foot concrete tanks with the water level set so that they maintained about 1,800 gallons each. Approximately 1,200 gallons of new water was pumped into the tanks each week. In the experimental tank the 125 oysters were fed at the rate of a half pound of blackstrap mollasses to each 1,800 gallons of water (20 mg. per liter). The fed oysters gained weight rapidly during the first two weeks, but for the following month their gain in weight was very slight. Towards the last of the experiment the control oysters suffered a high mortality. It has been suggested that this mortality may have been caused by Dermocystidium which, although not prevalent in South Carolina, is known to occur there. During the period of the experiment the salinity in the tanks ranged from 16.2 p.p.t. (parts per thousand) to 25.3 p.p.t., and the temperature from 25.0° C. to 33.0° C. (77° to 91.4° F.). This range of temperature is not conducive to the best oyster growth.

Without disturbing the individual oysters, the experiments were reversed so that the control oysters, which had suffered the high mortality, were fed with mollasses and the experimental oysters were unfed. Mortality rates declined after reversing the feeding.

In mid-August an additional experiment in feeding, this time using cracked rice, was initiated. The oysters fed with cracked rice in two weeks showed a higher increase in weight than those fed with molasses.

During July almost 30 inches of rain fell over coastal South Carolina. This heavy rainfall interfered seriously with the setting of oysters. The top foot of water in the creeks and rivers remained almost entirely fresh for long periods of time, excepting those areas very near the ocean. This condition either killed the young free-swimming oysters or

drove them to deeper waters of higher salinity. In any event, setting was practically nil. However, by mid-August setting again began on clean shell which had been placed in shell bags under the Laboratories' dock. For commercial planters this record-breaking rainfall worked a serious hardship. Shell cultch planted prior to the rain was badly silted by rain and runoff roiling the water. Most oystermen had not completed their shell-planting program prior to the onset of the rain. This will undoubtedly result in a low set of oysters and a smaller crop two years hence.

Shrimp Studies: In March 1964, based on relative abundance of postlarval brown shrimp in plankton tows, Bears Bluff Laboratories predicted that the commercial shrimp harvest in June and July 1964 would be about the same as last year. The commercial landings of shrimp during June and July 1964 amounted to 1,273,000 pounds. For the same period last year the commercial shrimp catch was 1,278,000 pounds.

Postlarval white shrimp were very scarce in plankton tows in the inshore waters of South Carolina this quarter. This, coupled with a decided shortage in the number of white "roe" shrimp in May and June gave rise to predictions by Bears Bluff Laboratories that the 1964 commercial catch of white shrimp would be poor this year. Both experimental trawling and commercial catch statistics have borne out the correctness of these predictions. In the experimental trawls during this quarter the catch per unit of effort was almost the same as that for the same quarter of last year. The commercial catch for August 1963 was 515,532 pounds; for August 1964, 488,025 pounds. Compare this with the August 1960 catch of 1,157,221!

A late run of white roe shrimp was noted in July and August of this year, and postlarvae resulting from the spawning of those shrimp began to show up in September in fair numbers, along with postlarvae of the spotted shrimp (*Penaeus duorarum*). The recruitment of those postlarvae was so late in the year that it is unlikely they will reach commercial size before the season closes in December, but if those shrimp can survive the winter, the outlook for 1965 may be improved considerably.

Finfish Studies: No major changes were noted in the abundance of commercial fish during the course of the Laboratories' survey

Average Catch Per Unit of Effort at Eight Regular Shrimp Survey Stations, July-September, 1960-1964

Year	Croaker	Spot	Brown Shrimp	White Shrimp
1964	80.5	24.8	31.1	15.4
1963	80.1	27.1	66.9	13.8
1962	75.9	29.5	23.3	58.4
1961	50.3	20.1	8.4	119.9
1960	26.7	39.3	33.9	131.3

work. Croakers, which have become increasingly plentiful in coastal waters during the past five years, were of almost the same abundance during July-September of this year as during that period of 1963. Spot were also found to be almost as plentiful during the quarter as during 1963.

Pond Cultivation: Experiments on the pond cultivation of shrimp continued during this quarter. Three ponds were treated with rotenone during July and the stocking and feeding of shrimp in the ponds was carried on through September. All ponds were to be drained and harvested during October 1964.

Due to the scarcity of postlarval and juvenile shrimp in coastal waters this year, the large one-acre ponds could not be stocked adequately, and a small harvest is expected. One of the one-acre ponds was allowed to stock naturally by tidal flow during the early spring and again in June and July. The remaining one-acre pond was allowed to stock naturally also, but in addition was stocked by hand with 2,309 juvenile brown shrimp during June and July.

A small 1/10-acre pond, however, was stocked heavily with juvenile and postlarval shrimp. Shrimp in that pond have been fed very heavily with chopped fish. During June-September the equivalent of over 1,000 pounds of food per acre was added.

Experiments on feeding and productivity are also being carried out in 3,000-gallon concrete tanks which have been stocked heavily with postlarval shrimp. One of those tanks was stocked with about 500 postlarval shrimp (the equivalent of 150,000 per acre) and those shrimp were fed heavily during June-September (through September 1964 the equivalent of over 3,000 pounds per acre of chopped fish had been fed). The experiments should give useful information on growth rates, effects of feeding on mortality, and productivity.

Experiments on the artificial breeding of shrimp were also continued during the quarter

with white shrimp (Penaeus setiferus). The scarcity of white roe shrimp this year has hindered those experiments greatly, and to date no shrimp have been spawned in the recently acquired circular concrete tanks set up at the Laboratories for this purpose. Only about 12 roe shrimp were obtained for the experiments and of those only about half had well developed roe. None of the latter, however, were fertilized and so attempts at spawning were futile. Roe shrimp must be plentiful in coastal waters before any success at those experiments can be expected. The chance of collecting a mature shrimp which is fertilized and in exactly the right stage of roe development is slim unless a considerable number of specimens are available. The experiments will be carried on with brown shrimp, which normally spawn during the fall and winter.

Shrimp of the genus Penaeus can withstand marked changes in salinity, but experimental work at Bears Bluff has indicated juvenile shrimp grow faster at high temperatures and high salinities. The excessive rainfall of July considerably lowered the salinity in the ponds. Actually, the excessive rainfall into the ponds and the greatly lowered salinity in the small creek from which the ponds get their water by tidal action should have reduced pond salinities to practically zero. However, construction of the ponds is such that the decline in salinity was much less than would be expected. Each of the ponds has an overflow which takes waters from the ponds at the surface. Even with a $4\frac{1}{2}$-inch rainfall in 24 hours most of the rainwater remained on the surface of the pond and drained out through the overflow. On July 22, when 20 inches of rain had already fallen during the month, only the top 6 or 8 inches of the ponds were fresh, and in the one-acre ponds below a depth of 18 inches bottom salinity remained in the 20's. Gradually, of course, mixing does occur, but this goes on at a slow rate and high salinities can be maintained despite torrential downpours.

Note: See Commercial Fisheries Review, May 1964 p. 33.

Tropical Atlantic

RESULTS OF FISHERY-OCEANOGRAPHIC STUDIES IN GULF OF GUINEA:

M/V "Geronimo" Cruise III (January 15-May 15, 1964): Biological and oceanographic studies in the Gulf of Guinea as part of EQUALANT III were completed in May 1964 by the oceanographic research vessel Geronimo, operated by the Washington, D. C., Biological Laboratory of the U. S. Bureau of Commercial Fisheries. The completion of this cruise ended the field phase of the International Cooperative Investigations of the Tropical Atlantic (ICITA).

Results of the two warm-season surveys made by the Geronimo of the distribution of surface schools of tuna reveal that it is likely that the distribution of those schools is related to upwelling-maturation processes associated, at least in part, with interrelationships among surface currents and coastline configurations. Direct current measurements and other observations made during the EQUALANT III portion of the cruise, have amplified the probable existence of a westerly flowing subsurface current under the easterly flowing Guinea current.

The analyses of stomach samples from tuna collected during this cruise have been completed. Difficulties in identifying the cephalopod component of tuna food were reconciled with the assistance of scientists of the University of Miami.

Identification of scombrid larvae from EQUALANT I was completed this past June. Charts have been prepared showing the distribution of skipjack tuna, yellowfin tuna, black skipjack, auxis, and a group of unidentified scombrid larvae. One interesting aspect was the broad distribution of black skipjack larvae in the pelagic waters of the Gulf of Guinea. Some of the larvae, hitherto unidentified, were tentatively identified at the Bureau's Biological Laboratory, Washington, D. C., by a visiting Japanese scientist, as big-eyed and albacore.

Tuna canneries in Puerto Rico have been visited by a Bureau scientist to arrange for the collection of catch data and biological samples for those tuna caught in the tropical Atlantic and off the east coast of the United States. Those collections are being coordinated with those of the Inter-American Tropical Tuna Commission.

Plans and schedules for Geronimo Cruise IV were completed this past August by scientists of the U. S. Bureau of Commercial Fisheries. The program will essentially be a repeat of seasonal comparison of that carried out during Cruise III.

Note: See Commercial Fisheries Review, July 1964 p. 24; April 1964 p. 47.

United States Fisheries

COMMERCIAL FISHERY LANDINGS, JANUARY-AUGUST 1964:

The U. S. catch of fish and shellfish in 1964 mostly for the first 8 months (in some instances various periods through September 18) was down 190 million pounds as compared with the same period in 1963. The decline occurred principally in landings of menhaden (down 161 million pounds) and Maine sea herring (down 44 million pounds), and to a lesser extent Atlantic ocean perch, shrimp, whiting, Pacific and jack mackerel, halibut, and salmon in Washington.

United States Commercial Fishery Landings of Certain Species for Periods Shown, 1964 and 1963

Species	Period	1/1964	1963	Total 1963
		.......(1,000 Lbs.)......		
Cod:				
Maine	7 mos.	1,700	1,433	1,960
Mass. 2/	8 "	18,300	22,879	31,475
Total cod		20,000	24,312	33,435
Flounder:				
Maine	7 mos.	700	910	1,216
Mass.	8 "	60,700	61,249	91,876
Total flounder		61,400	62,159	93,092
Haddock:				
Maine	7 mos.	1,700	1,378	2,878
Mass. 2/	8 "	87,000	80,255	106,075
Total haddock		88,700	81,633	108,953
Halibut: 3/				
Alaska	8 mos.	15,600	20,571	22,372
Wash. & Oreg.	8 "	8,100	10,538	11,871
Total halibut		23,700	31,109	34,243
Herring, Maine	7 mos.	24,100	68,148	152,317
Industrial fish (Me. & Mass.) 4/	8 mos.	21,900	40,493	47,897
Mackerel:				
Jack 5/	7 mos.	39,800	45,850	98,078
Pacific 5/	7 "	8,000	16,348	36,974
Menhaden	8 mos.	1,162,600	1,323,642	1,779,500
Ocean perch:				
Maine	7 mos.	30,800	38,417	63,905
Mass.	8 "	23,200	34,388	44,387
Total ocean perch		54,000	72,805	108,292
Pollock:				
Maine	7 mos.	700	1,803	2,489
Mass. 2/	8 "	6,000	5,732	10,727
Total pollock		6,700	7,535	13,216
Salmon, Alaska	Year	290,800	208,249	209,000
Sardine, Pacific	to Sept. 18	6,700	-	7,100
Scallops, sea, New Bedford (meats)	8 mos.	9,400	11,734	15,941
Shrimp (heads-on): So. Atl. & Gulf	8 mos.	107,700	120,000	219,900
Tuna, Calif.	to Sept. 12	210,700	196,142	285,285
Whiting:				
Maine	7 mos.	19,700	12,976	15,942
Mass.	8 "	33,300	47,185	64,571
Total whiting		53,000	60,161	80,513
Total all above items		2,189,200	2,370,320	3,323,736
Other 6/		437,000	445,881	1,426,409
Grand total.........		2,626,200	2,816,201	4,750,145

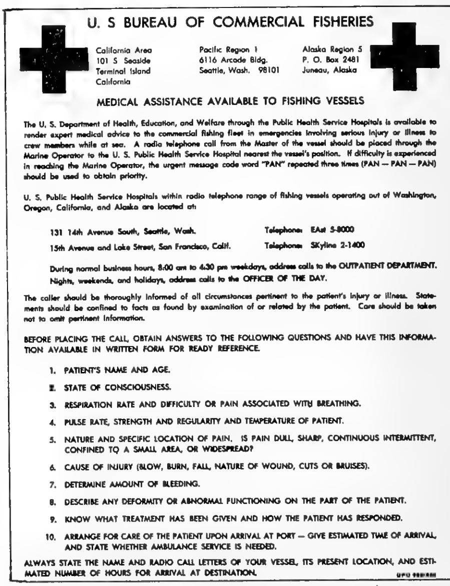
1/Preliminary.
2/Landed weight.
3/Dressed weight.
4/Excludes menhaden.
5/Cannery receipts.
6/Includes landings for species not listed.
Note: Finfish generally converted to round weight, crustaceans to weight in the shell, and mollusks reported in meats only.

There were increases in landings of salmon in Alaska, tuna, haddock, and Pacific sardines. Based on the Alaska canned pack and sales to Japanese freezerships, Alaska salmon landings amounted to approximately 291 million pounds--up 83 million pounds as compared with 1963. However, the increase in salmon landings in Alaska was offset by a sharp decrease in Puget Sound landings.

U.S. Fishing Vessels

EMERGENCY MEDICAL HELP INSTRUCTIONS FOR FISHERMEN:

Medical assistance available to fishing vessels in the three Pacific Coast States and Alaska is described on cards being distributed by the U. S. Bureau of Commercial Fisheries. However, the same medical assistance is available to all United States fishing vessels.



U. S BUREAU OF COMMERCIAL FISHERIES

California Area	Pacific Region 1	Alaska Region 5
101 S Seaside	6116 Arcade Bldg.	P. O. Box 2481
Terminal Island	Seattle, Wash. 98101	Juneau, Alaska
California		

MEDICAL ASSISTANCE AVAILABLE TO FISHING VESSELS

The U. S. Department of Health, Education, and Welfare through the Public Health Service Hospitals is available to render expert medical advice to the commercial fishing fleet in emergencies involving serious injury or illness to crew members while at sea. A radio telephone call from the Master of the vessel should be placed through the Marine Operator to the U. S. Public Health Service Hospital nearest the vessel's position. If difficulty is experienced in reaching the Marine Operator, the urgent message code word "PAN" repeated three times (PAN — PAN — PAN) should be used to obtain priority.

U. S. Public Health Service Hospitals within radio telephone range of fishing vessels operating out of Washington, Oregon, California, and Alaska are located at:

131 14th Avenue South, Seattle, Wash. Telephone: EAst 5-8000

15th Avenue and Lake Street, San Francisco, Calif. Telephone: SKyline 2-1400

During normal business hours, 8:00 am to 4:30 pm weekdays, address calls to the OUTPATIENT DEPARTMENT. Nights, weekends, and holidays, address calls to the OFFICER OF THE DAY.

The caller should be thoroughly informed of all circumstances pertinent to the patient's injury or illness. Statements should be confined to facts as found by examination of or related by the patient. Care should be taken not to omit pertinent information.

BEFORE PLACING THE CALL, OBTAIN ANSWERS TO THE FOLLOWING QUESTIONS AND HAVE THIS INFORMATION AVAILABLE IN WRITTEN FORM FOR READY REFERENCE.

1. PATIENT'S NAME AND AGE.
2. STATE OF CONSCIOUSNESS.
3. RESPIRATION RATE AND DIFFICULTY OR PAIN ASSOCIATED WITH BREATHING.
4. PULSE RATE, STRENGTH AND REGULARITY AND TEMPERATURE OF PATIENT.
5. NATURE AND SPECIFIC LOCATION OF PAIN. IS PAIN DULL, SHARP, CONTINUOUS INTERMITTENT, CONFINED TO A SMALL AREA, OR WIDESPREAD?
6. CAUSE OF INJURY (BLOW, BURN, FALL, NATURE OF WOUND, CUTS OR BRUISES).
7. DETERMINE AMOUNT OF BLEEDING.
8. DESCRIBE ANY DEFORMITY OR ABNORMAL FUNCTIONING ON THE PART OF THE PATIENT.
9. KNOW WHAT TREATMENT HAS BEEN GIVEN AND HOW THE PATIENT HAS RESPONDED.
10. ARRANGE FOR CARE OF THE PATIENT UPON ARRIVAL AT PORT — GIVE ESTIMATED TIME OF ARRIVAL, AND STATE WHETHER AMBULANCE SERVICE IS NEEDED.

ALWAYS STATE THE NAME AND RADIO CALL LETTERS OF YOUR VESSEL, ITS PRESENT LOCATION, AND ESTIMATED NUMBER OF HOURS FOR ARRIVAL AT DESTINATION.

Card describing medical assistance available to fishing vessels distributed by certain U. S. Bureau of Commercial Fisheries field offices. Only vessels of 5 net tons or more are eligible.

The cards--8 by $10\frac{1}{2}$ inches--are designed for display on fishing vessels so they may be referred to quickly in an emergency. The cards provide detailed instructions for the placing of radiotelephone calls to U.S. Public Health Service hospitals for advice in caring for seriously sick or injured persons at sea.

In a joint announcement, the Bureau's Regional Directors at Terminal Island, Calif., Seattle, Wash., and Juneau, Alaska, said:

"We hope the information on the cards will never be needed, but if it is, it is the sincere desire of the Bureau that it will be instrumental in saving a life or aiding in the treatment of the sick or injured. We recommend that every fishing boat on the Pacific Coast and Alaska have one of the cards posted in the wheelhouse."

The cards were distributed primarily through fishermen's associations, unions, and fish houses. They also may be obtained by writing to the Bureau of Commercial Fisheries at one of the following offices: 101 S. Seaside Avenue, Terminal Island, Calif.; 6116 Arcade Building, 1319 Second Avenue, Seattle, Wash.; or P.O. Box 2481, Juneau, Alaska.

* * * * *

DOCUMENTATIONS ISSUED AND CANCELLED:

July 1964: During July 1964, a total of 56 vessels of 5 net tons and over were issued first documents as fishing craft, as compared with 76 in July 1963. There were 41 documents cancelled for fishing vessels in July 1964, as compared with 47 in July 1963.

Table 1 - U.S. Fishing Vessels--Documents Issued by Tonnage and Area, July 1964 2/

Gross Tonnage	New England	Chesapeake	South Atlantic	Gulf	Pacific	Total
	. . . . (Number)					
5 - 9	2	1	-	1	5	9
10 - 19	1	-	-	5	7	13
20 - 29	1	-	-	4	6	11
30 - 39	-	-	1	-	2	3
40 - 49	-	-	-	1	1	2
50 - 59	-	-	2	1	2	5
60 - 69	-	-	-	2	-	2
70 - 79	1	-	1	6	-	8
80 - 89	-	-	1	2	-	3
Total	5	1	5	22	23	56

Note: For explanation of footnote, see table 4.

Table 2 - U.S. Fishing Vessels--Documents Issued by Vessel Length and Area, July 1964 2/

Length in feet	New England	Chesapeake	South Atlantic	Gulf	Pacific	Total
	. . . . (Number).					
23 - 23.9	1	-	-	-	-	1
26 - 26.9	-	-	-	-	1	1
27 - 27.9	-	-	-	-	2	2
28 - 28.9	-	-	-	-	1	1
29 - 29.9	-	-	-	-	1	1
30 - 30.9	-	-	-	1	2	3
31 - 31.9	-	-	-	-	1	1
32 - 32.9	1	-	-	-	-	1
33 - 33.9	1	1	-	1	1	4
35 - 35.9	-	-	-	-	1	1
36 - 36.9	-	-	-	1	1	2
37 - 37.9	-	-	-	1	-	1
38 - 38.9	-	-	-	3	-	3
39 - 39.9	1	-	-	-	3	4
40 - 40.9	-	-	-	-	1	1
41 - 41.9	-	-	-	1	2	3
42 - 42.9	-	-	-	-	2	2
43 - 43.9	-	-	-	1	-	1
44 - 44.9	-	-	1	-	-	1
45 - 45.9	-	-	-	1	-	1
49 - 49.9	-	-	-	-	4	4
55 - 55.9	-	-	1	1	-	2
58 - 58.9	-	-	-	1	-	1
59 - 59.9	1	-	-	-	-	1
60 - 60.9	-	-	-	1	-	1
61 - 61.9	-	-	1	-	-	1
62 - 62.9	-	-	-	1	-	1
63 - 63.9	-	-	1	-	-	1
65 - 65.9	-	-	-	5	-	5
66 - 66.9	-	-	1	1	-	2
67 - 67.9	-	-	-	1	-	1
68 - 68.9	-	-	-	1	-	1
Total	5	1	5	22	23	56

Note: For explanation of footnote, see table 4.

Table 3 - U.S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, July 1964 with Comparisons

Area (Home Port)	July 1964	July 1963	Jan.-July 1964	Jan.-July 1963	Total 1963
	. . . . (Number)				
Issued first documents 2/:					
New England	5	4	24	14	23
Middle Atlantic	-	4	5	12	18
Chesapeake	1	9	24	31	66
South Atlantic	5	11	30	44	77
Gulf	22	20	142	135	239
Pacific	23	28	103	136	160
Great Lakes	-	-	1	3	5
Hawaii	-	-	1	-	-
Puerto Rico	-	-	1	2	2
Total	56	76	331	377	590
Removed from documentation 3/:					
New England	9	7	20	33	48
Middle Atlantic	3	12	10	39	47
Chesapeake	3	2	11	12	25
South Atlantic	1	3	15	37	53
Gulf	5	14	39	76	118
Pacific	20	9	87	60	87
Great Lakes	-	-	6	9	15
Hawaii	-	-	-	1	3
Total	41	47	188	267	396

Note: For explanation of footnotes, see table 4.

Table 4 - U. S. Fishing Vessels--Documents Issued by Vessel Horsepower and Area, July 1964 2/

Horse-power	New England	Chesa-peake	South Atlantic	Gulf	Pacific	Total
	. . . . . (Number)					
40	-	-	-	-	1	1
61	-	-	-	1	-	1
85	-	-	-	1	-	1
90	-	-	-	-	2	2
125	-	-	-	-	1	1
130 - 139	-	-	-	1	2	3
140	1	-	-	-	-	1
150 - 159	-	-	-	1	2	3
160 - 169	1	-	1	4	3	9
170	-	-	-	2	3	5
185	-	-	-	-	2	2
190	-	1	-	1	-	2
200	-	-	-	1	-	1
220 - 229	2	-	2	5	1	10
230	-	-	-	1	-	1
240	-	-	-	-	1	1
280	-	-	-	-	1	1
300	-	-	-	3	4	7
320 - 329	-	-	2	1	-	3
335	1	-	-	-	-	1
Total	5	1	5	22	23	56

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 2 redocumented vessels in July 1964 that were previously removed from the records. Vessels issued first documents as fishing craft were built: 43 in 1964; 1 in 1963; 1 in 1962; 1 in 1960; and 10 prior to 1959.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Souce: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U. S. Treasury Department.

* * * * *

June 1964: During June 1964, a total of 72 vessels of 5 net tons and over were issued first documents as fishing craft, as compared with 62 in June 1963. There were 31 documents cancelled for fishing vessels in June 1964, the same as in June 1963.

Table 1 - U.S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, June 1964 with Comparisons

Area (Home Port)	June 1964	June 1963	Jan.-June 1964	Jan.-June 1963	Total 1963
	. . . . . (Number)				
Issued first documents 2/:					
New England	6	-	19	10	23
Middle Atlantic	-	1	5	8	18
Chesapeake	5	5	23	22	66
South Atlantic	4	6	25	33	77
Gulf	28	18	120	115	239
Pacific	27	30	80	108	160
Great Lakes	-	1	1	3	5
Hawaii	1	-	1	-	-
Puerto Rico	1	1	1	2	2
Total	72	62	275	301	590
Removed from documentation 3/:					
New England	3	2	11	26	48
Middle Atlantic	3	5	7	27	47
Chesapeake	1	-	8	10	25
South Atlantic	4	7	14	34	53
Gulf	7	7	34	62	118
Pacific	13	8	67	51	87
Great Lakes	-	2	6	9	15
Hawaii	-	-	-	1	3
Total	31	31	147	220	396

Note: For explanation of footnotes, see table 4.

Table 2 - U.S. Fishing Vessels--Documents Issued by Vessel Length and Area, June 1964 2/

Length in feet	New England	Chesa-peake	South Atlantic	Gulf	Pacific	Hawaii	Puerto Rico	Total
	. . . . . (Number).							
26 - 26.9	1	-	-	-	1	-	-	2
27 - 27.9	-	-	-	1	-	-	-	1
28 - 28.9	-	-	-	1	1	-	-	2
29 - 29.9	-	-	1	1	4	-	-	6
30 - 30.9	-	-	-	-	1	-	-	1
31 - 31.9	-	1	-	-	4	-	-	5
32 - 32.9	2	-	-	-	1	-	-	3
33 - 33.9	-	-	-	2	-	-	-	2
34 - 34.9	-	-	-	1	-	-	-	1
35 - 35.9	-	1	-	-	1	-	-	2
36 - 36.9	1	-	-	-	1	-	-	2
37 - 37.9	-	2	-	-	2	-	-	4
38 - 38.9	-	-	-	1	-	-	-	1
40 - 40.9	1	1	-	-	-	1	-	3
41 - 41.9	-	-	-	1	1	-	-	2
42 - 42.9	-	-	-	-	1	-	-	1
43 - 43.9	-	-	-	-	1	-	-	1
44 - 44.9	-	-	-	1	-	-	-	1
45 - 45.9	-	-	-	-	3	-	-	3
46 - 46.9	-	-	-	-	2	-	-	2
48 - 48.9	-	-	1	-	-	-	-	1
49 - 49.9	1	-	-	-	3	-	-	4
51 - 51.9	-	-	-	1	-	-	-	1
53 - 53.9	-	-	-	1	-	-	-	1
57 - 57.9	-	-	-	1	-	-	-	1
60 - 60.9	-	-	-	1	-	-	-	1
61 - 61.9	-	-	-	2	-	-	-	2
62 - 62.9	-	-	-	2	-	-	-	2
63 - 63.9	-	-	-	2	-	-	-	2
64 - 64.9	-	-	-	1	-	-	-	1
65 - 65.9	-	-	2	7	-	-	-	9
67 - 67.9	-	-	-	1	-	-	-	1
153 - 153.9	-	-	-	-	-	-	1	1
Total	6	5	4	28	27	1	1	72

Note: For explanation of footnote, see table 4.

Table 3 - U.S. Fishing Vessels--Documents Issued by Vessel Horsepower and Area, June 1964 2/

Horse-power	New Eng-land	Chesa-peake	South Atlantic	Gulf	Pacific	Hawaii	Puerto Rico	Total
	. . . . . (Number).							
60	1	-	-	-	-	-	-	1
70	-	1	-	-	-	-	-	1
80-89	1	-	-	2	1	-	-	4
97	-	-	-	1	-	-	-	1
100-109	-	-	-	-	6	1	-	7
110-119	1	-	1	2	-	-	-	4
130-139	-	-	-	2	1	-	-	3
140-149	-	-	-	1	2	-	-	3
160-169	-	1	1	3	6	-	-	11
170	-	-	-	2	-	-	-	2
180	-	-	-	-	1	-	-	1
210	-	1	-	-	3	-	-	4
220-229	2	2	2	6	-	-	-	12
230	-	-	-	1	-	-	-	1
245	-	-	-	1	-	-	-	1
250	-	-	-	1	2	-	-	3
280	-	-	-	-	3	-	-	3
300	-	-	-	5	1	-	-	6
330	-	-	-	-	1	-	-	1
340	-	-	-	1	-	-	-	1
370	1	-	-	-	-	-	-	1
1600	-	-	-	-	-	-	1	1
Total	6	5	4	28	27	1	1	72

Note: For explanation of footnote, see table 4.

Table 4 - U.S. Fishing Vessels--Documents Issued by Tonnage and Area, June 1964 2/

Gross Tonnage	New England	Chesa-peake	South Atlantic	Gulf	Pacific	Hawaii	Puerto Rico	Total
	. . . . .(Number).							
5 - 9	1	3	-	1	2	-	-	7
10 - 19	4	2	1	8	12	1	-	[illegible]8
20 - 29	-	-	-	-	4	-	-	4
30 - 39	1	-	1	2	3	-	-	7
40 - 49	-	-	-	-	3	-	-	3
50 - 59	-	-	-	3	2	-	-	5
60 - 69	-	-	-	3	1	-	-	4
70 - 79	-	-	2	8	-	-	-	10
80 - 89	-	-	-	1	-	-	-	1
90 - 99	-	-	-	2	-	-	-	2
800 - 809	-	-	-	-	-	-	1	1
Total	6	5	4	28	27	1	1	72

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 2 redocumented vessels in June 1964 that were previously removed from the records. Vessels issued first documents as fishing craft were built: 60 in 1964; 2 in 1963; and 10 prior to 1954.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U.S. Treasury Department.

* * * * *

FISHERIES LOAN FUND AND OTHER FINANCIAL AID FOR VESSELS, JULY 1-SEPTEMBER 30, 1964:

From the beginning of the program in 1956 through September 30, 1964, a total of 1,532 loan applications for $40,944,229 were received by the U. S. Bureau of Commercial Fisheries, the Agency administering the Federal Fisheries Loan Fund. Of the total, 811 applications ($18,281,097) had been approved, 509 ($12,366,919) had been declined or found ineligible, 181 ($7,403,905) had been withdrawn by the applicants before being processed, and 31 ($906,669) were pending. Of the applications approved, 304 were approved for amounts less than applied for. The total reduction was $1,985,639.

The following loans were approved from July 1, 1964, through September 30, 1964:

New England Area: Richard L. Spencer, Stonington, Maine, $5,000, and Clinton A. Babcock, Wakefield, R. I., $10,000.

California: Giuseppe Pennisi, Pacific Grove, $25,000, and Donald R. Brown, Santa Rosa, $9,000.

South Atlantic and Gulf Area: A. Irving Tormala, Fort Myers, Fla., $2,805; Elton S. Olier, Brownsville, Tex., $25,600; and Percy L. Wilhelm, Brownsville, Tex., $22,400.

Pacific Northwest Area: Ralph I. Lund, Bainbridge Island, Wash., $40,363; Merrill W. Henington, Poulsbo, Wash., $55,000; Harvey A. Harbaugh & Walter E. Linney, Seattle, Wash., $56,249; John B. Iverson, Seattle, Wash., $28,000; Roy E. Johnson, Seattle, Wash., $7,400; Ernest T. Mathisen, Seattle, Wash., $20,000; and Edwin E. & Donald Reyburn, Seattle, Wash. $6,000.

Alaska: John Goeres, Cordova, $15,000; Brechan Enterprises, Inc., Kodiak, $68,500; Sam E. Franklin, Kodiak, $4,917; Margarete von Scheele, Kodiak, $47,500; Carl A. Mills, Sitka, $12,000; and Robert I. Ditman & George W. Hillar, Valdez, $17,600.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the third quarter of 1964, 5 applications for $351,637 were received and 1 application for $35,483 was approved. Since the program began (July 5, 1960), 61 applications were received for $5,508,251. Of the total, 45 applications were approved for $3,005,504 and 10 applications for $1,805,131 were pending as of September 30, 1964. Since the mortgage program began, applications received and approved by area are:

New England Area: Received 12 ($1,314,500), approved 8 ($775,365).

California Area: Received and approved 1 ($557,000).

South Atlantic and Gulf Area: Received 38 ($1,735,727), approved 29 ($1,110,819).

Pacific Northwest Area: Received 7 ($1,846,250), approved 4 ($507,546).

Alaska Area: Received 3 ($54,774), approved 3 ($54,774).

The time for acceptance of applications for emergency fishery disaster loans to fishermen who had fishing vessels or gear lost or damaged in the Alaska earthquake and resulting tidal wave was extended by the Bureau from September 30 to October 31, 1964.

* * * * *

NEW SMALL STERN-TRAWLER "CANYON PRINCE":

Following trials in August 1964, the new small stern-trawler Canyon Prince was delivered to its owners in Point Judith, R. I. The 64-foot vessel was built by the same firm in Warren, R. I., which pioneered the development of small automated stern-trawlers with the launching of the 83-foot Narragansett in January 1963. An automated net-handling system is a prime feature of both vessels. A loaded net can be hauled on board the Canyon Prince by a single deckhand, as was demonstrated by a 17-year old girl during the vessel's trials. All hoists and winches are controlled from the pilothouse which overlooks the deck.

The Canyon Prince has a maximum holding capacity of 100,000 pounds of ice and fish.

Fig. - 1 New small stern-trawler Canyon Prince. Note the net drum midship.

Fig. 2 - Young girl hauls in bull rope at deck capstan on Canyon Prince, in a demonstration of automated net-handling equipment requiring a single deckhand.

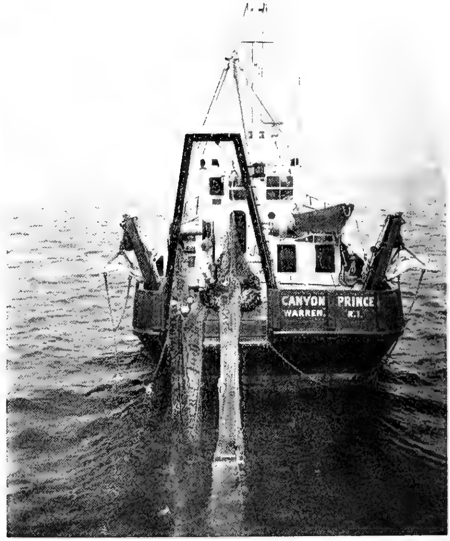


Fig. 4 - Cod-end comes over stern chute.

Fig. 3 - Cod-end approaches Canyon Prince; balance of net to the left is hauled by net drun.

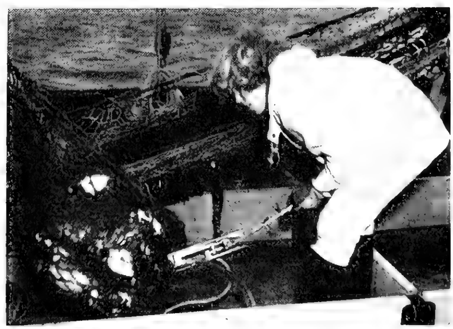


Fig. 5 - Tripping cod-end closer used aboard the Canyon Prince.

Power is provided by a Diesel engine of 340 horsepower which drives the vessel at a speed of $11\frac{1}{2}$ knots. Equipped with electronic fish-finding and navigating equipment, the vessel is particularly suited for trawling in marine canyons on the edge of the Continental Shelf. Being a western rig, it can be used for all types of fishing.

Note: See Commercial Fisheries Review, March 1963 p. 34; May 1962 p. 32.

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS, JANUARY-MAY 1964:

Airborne fishery imports into the United States in May 1964 were down 41.9 percent in quantity and 40.7 percent in value from those in the previous month due mainly to smaller shipments of shrimp from Venezuela.

Total airborne shrimp imports in May 1964 consisted of 304,917 pounds of fresh and frozen raw headless and 16,101 pounds of unclassified shrimp. About 95 percent of the airborne shrimp arrivals in May 1964 entered through the Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Galveston (Tex.), Los Angeles (Calif.), and New York (N. Y.).

Airborne finfish imports in May 1964 consisted mainly of fish fillets from Mexico.

Total airborne fishery imports in January-May 1964 were down 29.8 percent in quantity and 30.5 percent in value from those in the same period of 1963. The decline was due to smaller shipments of shrimp and lobsters.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products.

U. S. 1/Airborne Imports of Fishery Products, January-May 1964 with Comparative Data

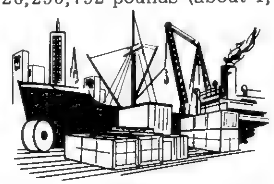
Product and Origin 2/	1964 May		1964 Jan.-May		1963 Jan.-May	
	Qty. 3/	Value 4/	Qty. 3/	Value 4/	Qty. 3/	Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Portugal	-	-	0.1	0.1	-	-
Mexico	42.1	11.5	150.9	41.9	124.3	38.6
British Honduras	-	-	1.8	0.4	33.9	8.6
Honduras	-	-	-	-	15.5	4.0
Japan	-	-	-	-	2.0	8.2
United Kingdom	0.2	0.4	1.9	3.6	1.3	3.3
Iran	-	-	-	-	1.2	7.4
France	-	-	4.3	7.8	0.7	0.6
Israel	-	-	1.3	0.8	-	-
Venezuela	-	-	4.6	1.7	-	-
Ireland	0.3	0.3	0.3	0.3	0.8	0.3
Denmark	0.1	0.3	0.3	0.4	-	-
Canada	-	-	13.2	4.3	-	-
Iceland	-	-	1.8	1.2	-	-
Spain	1.0	0.8	1.8	1.4	-	-
Total fish	43.7	13.3	182.3	63.9	179.7	71.0
Shrimp:						
Guatemala	-	-	-	-	117.1	62.1
El Salvador	15.0	10.4	159.1	96.8	163.5	115.0
Honduras	-	-	-	-	22.7	11.9
Nicaragua	16.1	9.6	47.2	27.6	256.8	85.0
Costa Rica	14.5	8.3	163.7	90.7	284.0	137.3
Panama	77.9	51.9	413.1	248.8	723.5	389.6
Venezuela	197.3	105.7	1,726.7	767.0	1,920.2	941.4
Ecuador	-	-	-	-	94.3	32.7
France	-	-	-	-	2.6	0.9
British Guiana	-	-	10.5	5.2	-	-
Mexico	-	-	-	-	5.0	1.8
Spain	0.2	0.1	0.2	0.1	-	-
Total shrimp	321.0	186.0	2,520.5	1,236.2	3,589.7	1,777.7
Shellfish other than shrimp:						
Mexico	-	-	9.0	4.8	73.0	42.6
British Honduras	-	-	82.8	50.4	108.9	78.5
El Salvador	-	-	-	-	5.0	3.6
Honduras	4.5	0.8	12.9	9.4	1.9	1.0
Nicaragua	-	-	50.5	40.0	71.3	49.3
Costa Rica	-	-	9.3	9.5	73.8	60.1
Jamaica	-	-	43.6	36.2	47.7	36.8
Netherlands Antilles	-	-	-	-	32.8	20.9
Colombia	-	-	-	-	6.4	15.8
Ecuador	-	-	-	-	2.2	1.8
Tunisia	-	-	-	-	0.8	0.9
British Guiana	5.9	1.6	14.5	3.2	1.7	0.3
Canada	-	-	1.2	0.9	128.5	66.3
Venezuela	-	-	-	-	13.7	6.0
Dominican Republic	3.8	0.5	7.4	1.1	6.2	5.0
Bahamas	-	-	10.6	6.8	-	-
Haiti	1.1	0.5	5.1	2.6	-	-
Other countries	0.2	0.3	0.4	0.5	2.5	2.1
Total shellfish (excl. shrimp)	15.5	3.7	247.3	165.4	576.4	391.0
Grand total	380.2	203.0	2,950.1	1,465.5	4,345.8	2,239.7

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipments is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F. o. b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
Note: These data are included in the overall import figures for total imports, i. e., these imports are not to be added to other import data published.
Source: United States Airborne General Imports of Merchandise, FT 380, May 1964, U. S. Bureau of the Census.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-August 29, 1964, amounted to 26,290,792 pounds (about 1,251,942 standard cases), according to preliminary data compiled by the U. S. Bureau of Customs. This was substantially less (21.3 percent) than the 33,425,128 pounds (about 1,591,673 standard cases) imported during January 1-August 31, 1963.



The quantity of tuna canned in brine which can be imported into the United States during the calendar year 1964 at the $12\frac{1}{2}$-percent rate of duty is limited to 60,911,870 pounds (or about 2,900,565 standard cases of 48 7-oz. cans). Any imports in excess of that quota will be dutiable at 25 percent ad valorem.

* * * * *

PROCESSED EDIBLE FISHERY PRODUCTS, JULY 1964:

United States imports of processed edible fishery products in July 1964 were up 25.3 percent in quantity and 12.6 percent in value from those in the previous month. In July there were much larger imports of groundfish fillets and blocks (increase mainly from Canada) and canned tuna in brine (increase mainly from Japan).

Compared with the same month in 1963, imports in July 1964 were down 6.2 percent in quantity and 5.3 percent in value, due mainly to smaller imports of groundfish blocks and canned tuna in brine. Imports were also down for canned crab meat, canned oysters, and canned salmon. But imports were up substantially for canned sardines not in oil, flounder fillets, sea catfish fillets, and ocean perch fillets.

In January-July 1964, imports were up 3.4 percent in value from those in January-July 1963, but the quantity of the im-

ports was almost the same for both periods. During January-July 1964, there was a sizable increase in imports of groundfish fillets and blocks (increase mainly from Canada and Iceland), flounder fillets, yellow pike fillets, and sea catfish fillets. But there was a considerable decline in imports of canned tuna, canned sardines not in oil, canned crab meat, and swordfish fillets.

U. S. Imports and Exports of Processed Edible Fishery Products, July 1964 with Comparisons

Item	Quantity				Value			
	July		Jan.-July		July		Jan.-July	
	1964	1963	1964	1963	1964	1963	1964	1963
	. (Millions of Lbs.) .				. . (Millions of $) . .			
Fish & Shellfish:								
Imports 1/ . .	48.1	51.3	292.0	292.1	14.3	15.1	87.7	84.8
Exports 2/ . .	2.8	1.8	23.6	18.4	1.4	1.0	10.4	7.6

1/Includes only those fishery products classified by the U. S. Bureau of the Census as "Manufactured foodstuffs." Included are canned, smoked, and salted fishery products. The only fresh and frozen fishery products included are those involving substantial processing, i.e., fish blocks and slabs, fish fillets, and crab meat. Does not include fresh and frozen shrimp, lobsters, scallops, oysters, and whole fish (or fish processed only by removal of heads, viscera, or fins, but not otherwise processed).
2/Excludes fresh and frozen.

Exports of processed edible fish and shellfish from the United States in July 1964 were down 15.2 percent in quantity from those in the previous month, although the value of the exports was the same in both months. There was a sharp decline in exports of the lower-priced canned mackerel, and somewhat lower shipments of canned sardines and canned shrimp. Exports of canned salmon (principally to the United Kingdom) showed little change from the previous month. There was a sharp increase in exports of canned squid due to larger shipments to Greece.

Compared with the same month of the previous year, the exports in July 1964 were up 55.6 percent in quantity and 40.0 percent in value. Larger shipments this July of canned salmon and canned squid more than offset smaller shipments of canned shrimp, canned sardines not in oil, and canned mackerel.

Processed fish and shellfish exports in the first 7 months of 1964 were up 28.3 percent in quantity and 36.8 percent in value from those in the same period of 1963. In January-July 1964 there were much larger shipments of canned mackerel. Shipments of canned salmon, canned sardines in oil, and canned shrimp were also higher, but exports of canned sardines not-in-oil and canned squid were down sharply.

Notes: (1) Prior to October 1963, the data shown above were included in news articles on "U. S. Imports and Exports of Edible Fishery Products." Before October 1963, data showing "U. S. Imports of Edible Fishery Products" summarized both manufactured and crude products. At present, a monthly summary of U. S. imports of crude or nonprocessed fishery products is not available; therefore, only imports of manufactured or processed fishery products are reported. The import data are, therefore, not comparable to previous reports of "U. S. Imports of Edible Fishery Products."
The export data shown are comparable to previous data in "U. S. Exports of Edible Fishery Products." The export data in this series have always been limited to manufactured or processed products.
(2) See Commercial Fisheries Review, Oct. 1964 p. 41.

Wages

NEW MINIMUM WAGES FOR ONSHORE FISHERY WORKERS:

Effective September 3, 1964, the minimum wage for onshore fishery workers, other than cannery workers, advanced to $1.15 an hour, pursuant to the Fair Labor Standards Act, as amended. The minimum wage for those onshore fishery workers will rise to $1.25 per hour on September 3, 1965. Fish cannery workers have been subject to the $1.25 minimum wage rate since September 3, 1963.

Note: See Commercial Fisheries Review, September 1963 p. 104.

Washington

SURVEY OF FISH AND WILDLIFE RESOURCES OF PUGET SOUND AND ADJACENT WATERS:

A Fisheries and Wildlife Technical Committee has been formed to make a comprehensive study of Puget Sound and adjacent waters in Washington State. The fish and wildlife study is part of a comprehensive Federal-State review of Puget Sound in which water and associated land resources will be examined to develop a multipurpose plan to meet short and long-term needs of the region.

The Committee will consider all water resource functions including hydroelectric power generation, fish and wildlife conservation and development, irrigation, flood control and drainage, recreation, navigation, and water quality control. The study is scheduled for completion in 1969 when a detailed report will be released.

The Fisheries and Wildlife Technical Committee includes representatives from the Washington State Department of Fisheries, the Washington State Department of Game, and the following Federal Agencies: Bureau of Sport Fisheries and Wildlife and the Bureau of Commercial Fisheries, both of the Fish and Wildlife Service; Forest Service; Soil Conservation Service; Economic Research Service; Corps of Engineers; Bureau of Outdoor Recreation; and the Public Health Service. Other Federal, state, county, and municipal agencies and groups are expected to contribute materially to the overall study.

The survey will include a study of fish and wildlife populations, distribution, and habitat; and a determination of commercial harvest and man days of fishing and hunting. An immediate task will be to determine basic fish and wildlife resource needs in specific basins and to alert water development agencies concerning protective and enhancement measures required in project planning. The primary emphasis during the first part of the study

will be on the Nooksack, Skagit, and Snohomish River basins.

Weather

STORM WARNING BUOYS FOR GULF OF MEXICO: An open sea weather observation and warning buoy was established in the Gulf of Mexico in mid-August 1964 by the U. S. Coast Guard. Known as the MAMOS (Marine Automatic Meteorological Observing Station), the new station will enable the U. S. Weather Bureau to receive advance indications of dangerous storms.

Made of aluminum, the unmanned buoy is 20 feet long, 12 feet wide, weighs $3\frac{1}{2}$ tons, and costs about $250,000. It is capable of operating a full year without attendance. Power for the buoy's electronic equipment is supplied by storage batteries, charged by wind-driven generators.

Weather measurements taken by the buoy are transmitted at regular intervals to inland receiving stations. Those measurements include air and water temperature, barometric pressure, and wind speed and direction.

A second MAMOS was established in the Gulf of Mexico in late September 1964. Future plans call for a total of 45 of the storm warning buoys.

Wholesale Prices

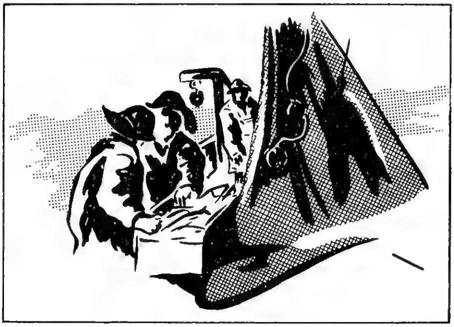
EDIBLE FISH AND SHELLFISH, SEPTEMBER 1964: Wholesale prices for most fresh fish and shellfish were higher from August to September 1964 and the overall wholesale price index for September rose 3.9 percent from the previous month. At 109.5 percent of the 1957-59 average, the index this September was 2.2 percent higher than in the same month of 1963.

Prices for all of the major products in the subgroup index for drawn, dressed, or whole finfish were higher this September than in the previous month and the index was up 11.6 percent. The only exception was Lake Superior whitefish with

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, September 1964 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Sept. 1964	Aug. 1964	Sept. 1964	Aug. 1964	July 1964	Sept. 1963
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					109.5	105.4	106.6	107.1
Fresh & Frozen Fishery Products:					113.3	106.9	109.3	110.6
Drawn, Dressed, or Whole Finfish:					127.9	114.6	114.9	125.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.14	.11	110.9	83.3	88.6	98.5
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.55	.42	153.4	122.7	118.3	128.6
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.98	.93	136.2	129.2	129.2	138.0
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.48	.53	70.9	78.3	78.3	100.7
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.55	.54	90.1	88.4	83.5	99.9
Processed, Fresh (Fish & Shellfish):					107.4	101.1	105.5	104.3
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.44	.36	106.9	86.2	83.8	104.4
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.82	.77	95.5	89.6	98.4	83.2
Oysters, shucked, standards	Norfolk	gal.	7.25	7.00	122.2	118.0	118.0	130.7
Processed, Frozen (Fish & Shellfish):					100.0	100.0	102.5	97.4
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.37	.38	92.5	95.0	95.0	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.37	.37	108.5	108.5	108.5	105.5
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.30	.31	103.4	106.9	108.7	117.5
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.81	.80	95.5	94.9	99.0	90.1
Canned Fishery Products:					103.1	103.1	102.2	101.4
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	21.75	22.25	94.8	97.0	97.0	104.6
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.56	11.56	102.6	102.6	102.1	96.6
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	6.25	6.25	105.9	105.9	105.9	97.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.00	9.31	128.3	119.4	113.0	102.1

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.



prices at Chicago down 9.5 percent. The more substantial price increases this September were for ex-vessel large haddock (up 33.1 percent) at Boston and western fresh halibut (up 25.0 percent) at New York City. Fresh halibut from the seasonal Pacific Northwest fishery were scarce in September due to the lower catches throughout most of the season and closure of the main fishing areas. Halibut landings by the end of the 1964 season should be down better than 10 million pounds from the previous year. At New York City, prices for fresh dressed king salmon (up 5.4 percent) were higher than in August, and there was a smaller increase in prices for fresh round yellow pike. As compared with September 1963, the subgroup index for drawn, dressed, or whole finfish this September was 1.8 percent higher because of higher prices for haddock and western halibut. Those higher prices were offset by lower prices for the remaining items in the subgroup.

The subgroup index for processed fresh fish and shellfish rose 6.3 percent from August to September and was higher than in September 1963 by 3.1 percent. Prices this September for fresh haddock fillets at Boston increased 24.0 percent from the previous month as a direct result of higher ex-vessel haddock prices. South Atlantic fresh shrimp prices (up 6.6 percent) at New York City were considerably stronger in September and there was a price increase for shucked standard oysters (up 25 cents a gallon) at Norfolk. As compared with September 1963, the subgroup index this September was 3.1 percent higher largely because of substantially higher prices for fresh shrimp and haddock fillets.

Several price changes this September for items in the processed frozen fish and shellfish subgroup did not affect the subgroup index which at 100 percent of the 1957-59 average remained unchanged from the previous month. But the index this September was 2.7 percent higher than in September 1963. Frozen shrimp prices (up 0.6 percent) at Chicago in September were up only slightly from August. The small price increase for shrimp, however, cancelled out price declines for ocean perch fillets (down 3.3 percent) and flounder fillets (down 2.6 percent). Prices for frozen shrimp this September were up 6.0 percent and for haddock fillets were up 2.8 percent from September 1963.

Although price changes occurred this September within the subgroup for canned fishery products, the index at 103.1 percent of the 1957-59 average was the same as in August. Prices for canned Maine sardines were up 7.5 percent from the previous month (and 25.7 percent higher than in September 1963). Supplies of canned sardines were low and the new season pack was far short of normal. Prices for canned pink salmon were down 2.3 percent from August to September because of liberal supplies. As of the end of September 1964, the Alaska canned salmon pack was 3.5 million cases, of which 1.9 million cases were pinks. As compared with September a year earlier, the subgroup index this September was 1.7 percent higher. September 1964 prices were up for all canned fish products except pink salmon (down 9.4 percent from September 1963).

International

NORTH PACIFIC FISHERIES CONVENTION

PARTIES TO THE CONVENTION RESUMED TALKS IN OTTAWA:

The third round in a series of talks between Canada, Japan, and the United States on the International Convention for the High Seas Fisheries of the North Pacific Ocean opened in Ottawa, September 9, 1964.

When ratified in 1953, the Convention had a guaranteed minimum life of 10 years and, thereafter, until 1 year from the date on which any member should give notice of termination. No such notice has been given, but last year, at the request of Japan, two rounds of negotiations took place among the contracting parties. The first round was held in Washington in June and the second in Tokyo during September and October.

During those meetings the Convention was reviewed to find a basis for resolving the different views developed as a result of the experience gained since 1953. Japan submitted a new draft convention which also was given consideration during the meetings.

Progress towards an agreement was made during the first two rounds of talks, but a further meeting was considered necessary which, at Canada's invitation, was held in Ottawa.

The United States Delegation to the Ottawa meeting was headed by Ambassador Benjamin A. Smith, and included Commissioner Clarence F. Pautzke, U. S. Fish and Wildlife Service, William C. Herrington, Special Assistant for Fisheries and Wildlife to the Under Secretary of State, and Director Donald L. McKernan, Bureau of Commercial Fisheries, U. S. Department of the Interior, as well as Congressional and other Advisers. On September 14, 1964, the U. S. Senate's President pro tempore appointed Senators Bartlett and Long to attend the meeting.

President Johnson from the White House on September 4, 1964, issued this statement regarding the negotiations of the parties to the International Convention for the High Seas Fisheries of the North Pacific Ocean:

"The third round of negotiations with Canada and Japan on North Pacific fisheries problems is scheduled to begin in Ottawa on September 9. I have just received a report on the issues involved from Ambassador Benjamin A. Smith II, who will head the United States Delegation in these negotiations. The major problem with which the negotiations will deal is the revision of the existing international arrangements for the conservation and rational utilization of the fishery resources in the north Pacific Ocean.

"Two earlier rounds of negotiations were held in Washington and Tokyo last year. They made substantial progress toward full agreement. I hope the negotiations can be completed during the new round of discussions.

"The primary objective of the United States in these negotiations is to protect the interests of Alaska and the Pacific Northwest in the North Pacific fisheries, which consist principally of salmon and halibut. The economy of these regions is heavily dependent upon the U. S. fisheries supported by these resources. The interests of the United States in these fishery stocks have been advanced by the International Convention for the High Seas Fisheries of the North Pacific Ocean. Basic to that Convention is the concept that in special situations, such as those exemplified by the North American salmon and halibut fisheries, where the countries participating in the fisheries have built up and maintained the resources through major research and regulatory programs, other countries should exercise restraints on their fishing of the type provided for in that Convention. This concept provides the incentives necessary to the establishment and continuation of the conservation measures essential to the attainment, both now and in the future, of the maximum harvest of food for mankind. This will insure the conservation of important marine resources and prevent irreparable damage to them through over-exploitation. This is in the common interest of Japan, Canada, and the United States.

"Over the years we have made major contributions to the restoration and maintenance of the salmon and halibut fisheries. For this reason, we have a special interest in them. We are determined to protect that interest, while giving every consideration to the legitimate interests of the other parties to the convention. I am confident that Ambassador Smith, who was the United States representative during the earlier discussions, will effectively present our point of view.

"I urge that the three delegations work out a solution that will permit the conservation of these resources for future generations, taking into account the unique circumstances surrounding the Convention and the interests of all parties to it."

Note: See Commercial Fisheries Review, November 1963 p. 54; June 1963 p. 57.

* * * * *

JAPANESE FISHING INDUSTRY POSITION ON NEGOTIATIONS:

The Japan-United States-Canada Special Committee of the Japan Fisheries Society, at a meeting on August 2, 1964, in Tokyo, formulated the Japanese fishing industry's position on the North Pacific Fisheries Convention renegotiation talks in Ottawa. The talks began September 9, 1964. Gist of the industry's recommendations submitted to the Japanese Fisheries Agency Director is as follows:

(1) To maximize utilization of the fishery resources of the high seas, the resources (placed under abstention) should be released, and the obligation for joint conservation of such resources should be assumed on an equal footing.

(2) Any arrangement which would result in the exclusive utilization of fishery resources by the coastal country in form or in fact must be absolutely opposed.

International (Contd.):

(3) Industry's consistent desire is to abolish the abstention principle in fact and not merely to eliminate it as an expression of term in the text of the Treaty.

The meeting was attended by over 20 persons (Shin Suisan Shimbun Sokuho, September 3, 1964.)

The Japanese Fisheries Agency Director at a press conference on September 1, told reporters that he anticipated difficulties in the Ottawa talks to renegotiate the North Pacific Fisheries Convention. He stated that so long as the contracting parties stand opposed on the interpretation of resources, progress cannot be achieved. He pointed out the importance of guiding the discussions on a practical basis, and for this purpose felt that all parties should submit their substitute proposals (Minato Shimbun, September 2, 1964.)

* * * * *

JAPANESE PRESS REACTION TO TALKS:

The following are reactions printed by the Japanese press to the third round in a series of talks between Canada, Japan, and the United States on the International Convention for the High Seas Fisheries of the North Pacific Ocean. The talks opened in Ottawa, September 9, 1964.

(1) Discriminatory treatment forced upon Japan during the period of occupation must be eliminated. The North Pacific Fishery Treaty and the United States-Japan Aviation Agreement were cited as discriminatory. Attention was being focused on the Ottawa meeting because of similarity in nature to the United States-Japan aviation talks which ended in deadlock when the United States was unwilling to give up special rights and interests obtained during the period of occupation.

(2) Japan should not agree to the principle of historic fishing rights advocated by the United States at the Tokyo meeting in 1963, which is tantamount to monopolistic division of fishery resources by specific countries, i.e., the United States and Canada. The historic rights principle is more objectionable than the principle of abstention because it closes the door indefinitely to Japanese fishermen whereas under the abstention principle the possibility does exist to fish underutilized stocks of fish.

(3) Japan should not approve United States demands for unilateral self-restraint in the fisheries of the Northeastern Pacific.

(4) Unwillingness on the part of the United States to compromise its stand on vested fishery rights, together with the President's announcement to protect United States interests in the North Pacific fisheries, places unnecessary strain on friendly relations between Japan and the United States.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

NEW CONVENTION APPROVED AT CONFERENCE IN COPENHAGEN:

A new Convention for the International Council for the Exploration of the Sea (ICES) was considered and agreed upon by representatives of member Governments of that organization at a conference in Copenhagen, September 7-12, 1964. The Governments represented at the Conference were Belgium, Denmark, Finland, France, the Federal Republic of Germany, Iceland, Ireland, Italy, the Netherlands, Norway, Poland, Spain, Sweden, the U.S.S.R., and the United Kingdom.

Neither ICES nor its personnel have had the usual international status of an organization of its type. The new Convention is intended to correct those problems; it describes the purpose of ICES and outlines organizational and financial procedures.

The new Convention shall be open until December 31, 1964, for signature on behalf of the Governments of all States which participate in the work of ICES. The new Convention shall enter into force on July 22 next following the deposit of instruments of ratification or approval by all signatory Governments. Under certain conditions, the new Convention may also be placed in force if at least three-fourths of the signatory Governments deposit instruments of ratification or approval by January 1, 1968.

Following is the text of the new Convention, as agreed upon September 12, 1964:

Convention for the International Council for the Exploration of the Sea

PREAMBLE.

The Governments of the States Parties to this Contion

Having participated in the work of the International Council for the Exploration of the Sea, which was estab-

International (Contd.):

lished at Copenhagen in 1902 as a result of conferences held in Stockholm in 1899 and in Christiania in 1901 and entrusted with the task of carrying out a program of international investigation of the sea

Desiring to provide a new constitution for the aforesaid Council with a view to facilitating the implementation of its program

Have agreed as follows:

ARTICLE 1

It shall be the duty of the International Council for the Exploration of the Sea, hereinafter referred to as the "Council,"

(a) to promote and encourage research and investigations for the study of the sea particularly those related to the living resources thereof;

(b) to draw up programs required for this purpose and to organize in agreement with the Contracting Parties, such research and investigation as may appear necessary;

(c) to publish or otherwise disseminate the results of research and investigations carried out under its auspices or to encourage the publication thereof.

ARTICLE 2

The Council shall be concerned with the Atlantic Ocean and its adjacent seas and primarily concerned with the North Atlantic.

ARTICLE 3

(1) The Council shall be maintained in accordance with the provisions of this Convention.

(2) The seat of the Council shall remain at Copenhagen.

ARTICLE 4

The Council shall seek to establish and maintain working arrangements with other international organizations which have related objectives and cooperate, as far as possible, with them, in particular in the supply of scientific information requested.

ARTICLE 5

The Contracting Parties undertake to furnish to the Council information which will contribute to the purposes of this Convention and can reasonably be made available and, wherever possible, to assist in carrying out the programs of research coordinated by the Council.

ARTICLE 6

(1) Each Contracting Party shall be represented at the Council by not more than two delegates.

(2) A delegate who is not present at a meeting of the Council may be replaced by a substitute who shall have all the powers of the delegate for that meeting.

(3) Each Contracting Party may appoint such experts and advisers as it may determine to assist in the work of the Council.

ARTICLE 7

(1) The Council shall meet in ordinary session once a year. This session shall be held in Copenhagen, unless the Council decides otherwise.

(2) Extraordinary sessions of the Council may be called by the Bureau at such place and time as it may determine and shall be so called on the request of at least one-third of the Contracting Parties.

ARTICLE 8

(1) Each Contracting Party shall have one vote in the Council.

(2) Decisions of the Council shall, except where otherwise in this Convention specially provided, be taken by a simple majority of the votes cast for or against. If there is an even division of votes on any matter which is subject to a simple majority decision, the proposal shall be regarded as rejected.

ARTICLE 9

(1) Subject to the provisions of this Convention, the Council shall draw up its own Rules of Procedure which shall be adopted by a two-thirds majority of the Contracting Parties.

(2) English and French shall be the working languages of the Council.

ARTICLE 10

(1) The Council shall elect from among the delegates its President, a first Vice-President, and a further 5 Vice Presidents. This last number may be augmented by a decision taken by the Council by a two-thirds majority.

(2) The President and the Vice-Presidents shall assume office on the first day of November next following their election, for a term of three years. They are eligible for reelection according to the Rules of Procedure.

(3) On assuming office the President shall cease forthwith to be a delegate.

ARTICLE 11

(1) The President and Vice-Presidents shall together constitute the Bureau of the Council.

(2) The Bureau shall be the Executive Committee of the Council and shall carry out the decisions of the Council, draw up its agenda, and convene its meetings. It shall also prepare the budget. It shall invest the reserve funds and carry out the tasks entrusted to it by the Council. It shall account to the Council for its activities.

ARTICLE 12

There shall be a Consultative Committee, a Finance Committee, and such other committees as the Council may deem necessary for the discharge of its functions with the duties respectively assigned to them in the Rules of Procedure.

International (Contd.):

ARTICLE 13

(1) The Council shall appoint a General Secretary on such terms and to perform such duties as it may determine.

(2) Subject to any general directions of the Council, the Bureau shall appoint such other staff as may be required for the purposes of the Council on such terms and to perform such duties as it may determine.

ARTICLE 14

(1) Each Contracting Party shall pay the expenses of the delegates, experts, and advisers appointed by it, except in so far as the Council may otherwise determine.

(2) The Council shall approve an annual budget of the proposed expenditure of the Council.

(3) In the first and second financial years after this Convention enters into force in accordance with Article 16 of this Convention, the Contracting Parties shall contribute to the expenses of the Council such sums as they respectively contributed or undertook to contribute, in respect of the year preceding the entering into force of this Convention.

(4) In respect of the third and subsequent financial years, the Contracting Parties shall contribute sums calculated in accordance with a scheme to be prepared by the Council and accepted by all the Contracting Parties. This scheme may be modified by the Council with the agreement of all Contracting Parties.

(5) A Government acceding to this Convention shall contribute to the expenses of the Council such sum as may be agreed between that Government and the Council in respect of each financial year until the scheme under paragraph 4 provides for contributions from that Government.

(6) A Contracting Party which has not paid its contribution for two consecutive years shall not enjoy any rights under this Convention until it has fulfilled its financial obligations.

ARTICLE 15

(1) The Council shall enjoy, in the territories of the Contracting Parties, such legal capacity as may be agreed between the Council and the Government of the Contracting Party concerned.

(2) The Council, delegates and experts, the General Secretary, and other officials shall enjoy in the territories of the Contracting Parties such privileges and immunities, necessary for the fulfillment of their functions, as may be agreed between the Council and the Government of the Contracting Party concerned.

ARTICLE 16

(1) This Convention shall be open until 31st December, 1964, for signature on behalf of the Governments of all States which participate in the work of the Council.

(2) This Convention is subject to ratification or approval by the signatory Governments in accordance with their respective constitutional procedures. The instruments of ratification or approval shall be deposited with the Government of Denmark, who will act as the depository Government.

(3) This Convention shall enter into force on the 22nd July next following the deposit of the instruments of ratification or approval by all signatory Governments. If, however, on the 1st January, 1968, all the signatory Governments have not ratified this Convention, but not less than three quarters of the signatory Governments have deposited instruments of ratification or approval, these latter Governments may agree among themselves by special protocol on the date on which this Convention shall enter into force and on other related matters; and in that case this Convention shall enter into force with respect to any other signatory Government that ratifies or approves thereafter, on the date of deposit of its instrument of ratification or approval.

(4) After the entry into force of this Convention in accordance with paragraph 3 of this Article, the Government of any State may apply to accede to this Convention by addressing a written application to the Government of Denmark. It shall be permitted to deposit an instrument of accession with that Government after the approval of the Governments of three quarters of the States which have already deposited their instruments of ratification, approval, or accession has been notified to the Government of Denmark. For any acceding Government this Convention shall enter into force on the date of deposit of its instrument of accession.

ARTICLE 17

At any time after two years from the date on which this Convention has come into force, any Contracting Party may denounce the Convention by means of a notice in writing addressed to the Government of Denmark. Any such notice shall take effect 12 months after the date of its receipt.

ARTICLE 18

When the present Convention comes into force it shall be registered by the depository Government with the Secretariat of the United Nations Organization in accordance with Article 102 of its Charter.

FINAL CLAUSE

IN WITNESS WHEREOF the undersigned being duly authorized have signed the present Convention:

DONE at Copenhagen this twelfth day of September 1964, in the English and French languages, both texts being equally authentic, in a single copy which shall be deposited in the archives of the Government of Denmark who shall forward certified true copies to all signatory and acceding Governments.

Note: See Commercial Fisheries Review, Aug. 1964 p. 51.

INTERNATIONAL CONVENTION ON THE TERRITORIAL SEA AND CONTIGUOUS ZONE

DOMINICAN REPUBLIC RATIFIES CONVENTION:

The instrument of ratification by the Dominican Republic of the Convention on the Ter-

International (Contd.):

ritorial Sea and Contiguous Zone was deposited on August 11, 1964. The ratification entered into force on September 10, 1964.

The Convention was formulated at the United Nations Conference on the Law of the Sea at Geneva on April 29, 1958.

FISH MEAL

PRODUCTION AND EXPORTS FOR SELECTED COUNTRIES, JANUARY-JUNE 1963-1964:

Member countries of the Fish Meal Exporters' Organization (FEO) account for about 90 percent of world exports of fish meal. The FEO countries are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa. Production and exports of fish meal by FEO countries during January-June 1964 were up substantially from the same period of the previous year.

Table 1 - Exports of Fish Meal by Member Countries of the FEO, January-June 1963-1964

Country	June		Jan.-June		Total
	1964	1963	1964	1963	1963
	. . (1,000 Metric Tons) . .				
Chile	10.5	1/	72.6	1/	1/
Angola	5.3	2.3	29.2	13.8	30.0
Iceland	5.3	3.2	53.0	37.2	99.1
Norway	13.6	5.6	109.0	41.6	102.1
Peru	106.4	84.7	771.4	614.3	1,159.4
So. Africa (including S.-W. Africa)	16.7	16.1	106.9	72.5	198.8
Total	157.8	111.9	1,142.1	779.4	1,589.4

Table 2 - Production of Fish Meal by Member Countries of the FEO, January-June 1963-1964

Country	June		Jan.-June		Total
	1964	1963	1964	1963	1963
	. . (1,000 Metric Tons) . .				
Chile	15.7	1/	91.0	1/	1/
Angola	5.8	2.3	30.6	13.1	31.5
Iceland	17.2	4.8	52.9	39.6	87.2
Norway	13.8	19.5	99.8	45.1	132.2
Peru	91.9	98.5	869.6	700.9	1,159.2
So. Africa (including S.-W. Africa)	29.2	32.2	159.2	146.8	238.0
Total	173.6	157.3	1,303.1	945.5	1,648.1

1/Data not available. Chile became a member of FEO at the end of 1963.

During the first 6 months of 1964, Peru accounted for 67.5 percent of total fish-meal exports reported by FEO countries, followed by Norway with 9.5 percent, South Africa with 9.4 percent, Chile with 6.4 percent, Iceland with 4.6 percent, and Angola with 2.6 percent. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, September 11, 1964.)

* * * * *

WORLD PRODUCTION, JUNE 1964:

World fish meal production in June 1964 held steady at about the same level as in the previous month, according to preliminary data from the International Association of Fish Meal Manufacturers. Compared with the same month in the previous year, world fish meal production in June 1964 was up about 7 percent due mainly to higher output in Chile, Iceland, the United States, and Angola.

World fish meal production in the first 6 months of 1964 was considerably above that in the same period of 1963. The increase was due largely to expanded production in Peru which accounted for about 56 percent of world output during January-June 1964. Higher production during January-June 1964 was also reported in Norway, South Africa, Chile, Iceland, and Angola. The increase was partly offset by lower production in Canada, Denmark, and the United States.

Most of the principal countries producing fish meal submit data to the Association monthly (see table).

World Fish Meal Production by Countries, January-June 1963-1964

Country	June		Jan.-June	
	1964	1963	1964	1963
	. . . . (Metric Tons)			
Canada	5,533	5,966	21,934	37,910
Denmark	11,776	11,485	41,850	47,444
France	1,100	1,100	6,600	6,600
German Fed. Rep.	5,727	5,821	37,277	38,949
Netherlands	600	300	3,500	2,000
Spain	1/	1/	1/	10,869
Sweden	238	324	3,666	3,107
United Kingdom	6,471	6,656	40,283	38,849
United States	39,548	2/31,620	76,160	2/82,590
Angola	5,795	2,288	2/30,542	13,462
Iceland	17,210	4,754	52,879	39,568
Norway	13,787	19,469	99,835	44,488
Peru	91,904	98,657	869,682	701,507
So. Afr. (incl. S.-W. Africa)	29,316	34,393	163,593	147,997
Belgium	375	375	2,250	2,250
Chile	15,727	5,692	90,980	2/67,797
Morocco	1/	1/	3/ 4,060	1/
Total	245,107	228,900	1,545,091	1,285,387

1/Data not available.
2/Revised.
3/Data available only for January-May 1964.
Note: Japan does not report fish meal production to the International Association of Fish Meal Manufacturers at present.

ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

BUREAU MEETING OF FISHERIES COMMITTEE HELD:

A Bureau meeting of the Fisheries Committee, Organization for Economic Cooperation and Development (OECD), was held on September 7, 1964, in Paris, France. The purpose of the Bureau meeting was to consider and approve the draft 1965 program on behalf of the full committee. The meeting was attended by the U. S. Regional Fisheries Attache for Europe, United States Embassy, Copenhagen.

FOOD AND AGRICULTURE ORGANIZATION

FISHERY TRAINING CENTER TO BE BUILT IN SOUTH KOREA:

The Food and Agriculture Organization (FAO) is scheduled to build a fishery training center in Pusan, Korea, as part of FAO's five-year technical development assistance pro-

International (Contd.):

gram for the Republic of Korea. The center, to be financed by the U.N. Special Fund, will train 30-40 Korean fishery technicians each year.

Two training vessels (one 200-ton tuna vessel and one 150-ton trawler) will be used by the center, and bid invitations for their construction are expected to be sent to Japanese firms. (Suisancho Nippo, August 22, 1964.)

WHALING

SOVIETS PROPOSE CONFERENCE FOR REVISION OF ANTARCTIC CATCH ALLOCATION:

The Soviet Union is reported to be dissatisfied with the reduction in her whale catch quota for the 19th International Antarctic Whaling Expedition, which begins in December 1964, and proposed this past fall that the three whaling countries--Japan, U.S.S.R., and Norway--hold a conference to revise the present catch allocation.

A catch quota of 8,000 blue-whale units was informally agreed to by Japan, Norway, the Soviet Union, and the Netherlands this year, since the International Whaling Commission, which met in Sandefjord, Norway, in June 1964, failed to reach agreement on the catch quota for the 19th Antarctic Whaling Expedition. The Netherlands, however, sold her whale factoryship Willem Barendsz (26,830 gross tons) and her six-percent international whale catch quota to Japan in August this year. Thus, the number of countries participating in the 1964/65 Antarctic Whaling Expedition was reduced to three. Their catch quotas are: Japan 4,160 blue-whale units (52 percent); Norway 2,240 units (28 percent); Soviet Union 1,600 units (20 percent).

Reportedly, the Soviet Union, which plans to operate 4 fleets, considers her catch share insufficient and seeks a quota increase to around 2,000 blue-whale units. She claims that the catch quota allocation and the observer system adopted in 1962, when there were 5 nations participating in the Antarctic whaling expedition, need to be revised since there are now only 3 nations engaged in whaling. Japan's position is that the 1962 agreement is effective for another two years and it was on that basis that she purchased the Dutch whale factoryship and that factoryship's six-percent international catch quota.

Informed observers in Japan foresee possible Soviet withdrawal from the 1962 agreement. Japan fears that this would disrupt orderly whaling operations and would result in a free-for-all competition, to the detriment of the Antarctic whale resources. Moreover, she considers that such a move by the Soviet Union would render meaningless the high price Japan has paid for the Dutch whale factoryship and her catch quota. Therefore, should a meeting of the three whaling nations be called, as requested by the Soviet Union, Japan is expected to strongly insist upon retaining her 52-percent catch quota. (Suisan Tsushin, September 16; Suisan Keizai Shimbun, September 11, 1964; and other sources.)

Note: See Commercial Fisheries Review, September 1964 p. 54; August 1964 pp. 52, 76; April 1964 pp. 62, 66.

Argentina

FISHERIES TRENDS, 1963-1964:

Landings in 1963: Argentina's commercial fishery landings in 1963 amounted to 122,308 metric tons with an ex-vessel value of 1,170 million pesos (US$8.5 million). Compared with 1962 landings of 92,326 tons valued at 806 million pesos ($7.1 million), the 1963 landings increased 33 percent in quantity and 364 million pesos in value. (A comparison of the U. S. dollar value of the landings for the two years, however, is not a true comparison because the Argentine peso depreciated from an average dollar value of 113.3 pesos in 1962 to an average of 137.8 pesos to the dollar in 1963.)

In 1963 there was expansion in practically all segments of the Argentine fishery industry. It was a peak year for commercial fishing, production of processed fishery products and byproducts, and exports. Continued progress was anticipated for 1964, with estimates of fishery landings placed at about 200,000 tons.

The record commercial fishery landings for 1963 were due to a number of reasons among which are included: (1) the increased capacity and demand of freezing and packing plants, especially for fish fillets for export; (2) the growing demand in the domestic market and abroad for fish meal, and the expanded plant capacity in Mar del Plata for processing it; (3) the reactivation of the anchovy, horse mackerel, and tuna-canning industry; and (4) the increased tonnage of the deep-sea fishing fleet.

Argentina (Contd.):

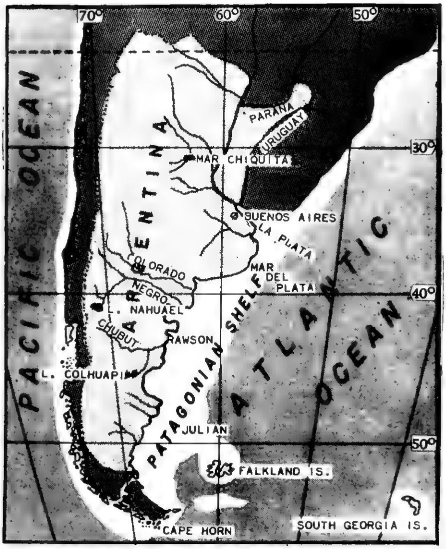


Fig. 1 - Map of Argentina showing extensive Continental Shelf.

Fishing Fleet: The Argentine maritime fishing fleet operating in 1963 consisted of 38 deep-sea trawlers manned by some 450 crew members. During the year those vessels made 1,697 trips and caught 57,280 tons of fish, about 90 percent of which was whiting (merluza). In addition, an inshore coastal fleet of 313 vessels and 25 other small craft with a total of about 1,600 crew members landed 53,039 tons (mostly anchovies and mackerel). The commercial fresh-water fish catch in 1963 amounted to 11,988 tons, mostly shad, smelt, and several other species.


Fig. 2 - Shrimp fishing vessels docked at the Mar del Plata port (Buenos Aires Province).

Utilization of Fishery Catch: Of the total 1964 fishery landings of 122,308 tons, about 43,000 tons went into fresh (iced) fish consumption and the remainder was used for manufacturing processed fishery products and byproducts valued at about 2,399 million pesos ($17.3 million). Included were canned fish and shellfish (13,264 tons); chilled and frozen fish and shellfish (14,852 tons--mostly "whiting," round, dressed, fillets); fish meal (8,055 tons); and fish oil (1,199 tons). Rapid growth was indicated in 1963 in the canning, freezing, and fish-meal-producing segments of the industry.


Fig. 3 - Unloading and packing fish at Mar del Plata.

Fish Meal: Argentina's fish meal production more than doubled in 1963 as compared with the previous year, and another substantial increase is anticipated for 1964. By 1963 there were 5 major fish meal plants operating in Mar del Plata with a total annual capacity of some 12,000 tons, and plans were under way for the construction of 6 more plants. A significant increase in fish meal production for use as poultry feed was expected as a result of two meatless days a week initiated by the government. Also, there have been some experiments in the production of fish flour for human consumption using a freeze-drying process.

Foreign Trade: In 1963 Argentina switched from its former position of net importer of fishery products to that of net exporter. Argentine exports of fishery products and byproducts increased in 1963 to 7,353 tons valued at $1.2 million from 2,532 tons with a value of $391,884 in 1962. An additional 1,458 tons of ocean seaweed (valued at $287,713) was exported in 1963, as compared to 992 tons worth $204,710 in 1962. Argentine imports of fishery products and byproducts in 1963 dropped to to 2,361 tons (value $835,039) from 2,560 metric tons (value $1,022,014) in 1962. The two most important fishery exports in quantity and value were frozen fish--2,768 tons worth

Argentina (Contd.):

$707,841 in 1963, over half of which went to Spain, and fish meal (3,978 tons valued at $396,552), principally to West Germany.

Argentine exports to the United States in 1963 were: 244 tons of frozen fish valued at $116,397 and 1 ton of seaweed valued at $200. In 1962, exports to the United States consisted of 331 tons of frozen fish valued at $133,312, and a very small quantity of canned fish. Argentina imported only a very small quantity of canned fish, caviar, and some other prepared fish products from the United States in 1963 and 1962.

Fig. 4 - Result of a one-hour groundfish drag by Argentine fishing vessel at 120 fathoms--latitude about 42nd south parallel.

Fishery Resources Potential: The Argentine Continental Shelf covers an area of nearly 400,000 square miles. International fishery experts believe it abounds in marine species of commercial value, especially in the zone between parallels 38° and 44° south where the Antarctic and Equatorial currents converge. Argentine Government officials estimate potential fishery yields as high as four million tons annually. Actual exploitation has never measured more than a small fraction of that amount. Nevertheless, Government officials believe that in view of the short distance of the underexploited fisheries resources from Argentine fishing ports, adequate capital investment for expanding the national commercial fishing fleet and industry would place Argentina in a highly advantageous export position. Moreover, it has been argued that, with increased domestic consumption of fish, a corresponding amount of meat products could be diverted into the export market.

Developments in 1964: When in the first half of 1964 there developed a shortage of domestic beef and constantly increasing beef prices, renewed attention was given to Argentina's underutilization of the rich fishery resources off its continental shores, and to the fact that Argentina has one of the lowest average per capita fish consumption rate in the world (2.7 kilograms or about 6 pounds edible weight in 1963). Significant developments affecting the Argentine fishing industry in 1964 were:

1. In June the Argentine Central Bank announced that, as the first step in an overall promotion scheme for the fishing industry, it would make available, through rediscounts to the Bank of the Nation and the Industrial Bank, credits totaling 709 million pesos (about $5.1 million) to finance the construction of fishing trawlers, modernization of the canning and freezing/chilling industry plant and equipment, the acquisition of refrigerated storage facilities and transport, and the installation of modern fish markets. Promotion credits for the fishing industry, especially in the commercialization sector, also were expected to be released by the Provincial Bank of Buenos Aires.

2. As an emergency measure to deal with the short supply of fishing vessels, the Executive Branch issued Decree 4,508/64 of June 17, 1964, establishing one-year authority for Argentine-chartered trawlers under LAFTA-country registry (primarily Peruvian and Chilean) to engage in deep-sea fishing outside Argentina's jurisdictional waters, and according national treatment to fish catches by those vessels. The Argentine Government received offers from Spain, Japan, and Yugoslavia to supply fishing vessels in exchange for Argen-

Argentina (Contd.):

tine meat and agricultural products. However, a Government proposal to modify existing legislation protecting the Argentine shipbuilding industry met with such stiff opposition from the local shipbuilding associations that the project was temporarily shelved. About 15 fishing vessels newly constructed had been expected to be operating in 1964 but only about 7 of them will be completed this year.

3. The presence of foreign fishing fleets (principally Japan and the U.S.S.R., but also of several West European nations, Brazil, and Uruguay) in the deep-sea fishing areas off the Argentine coast was cited by the Executive Branch as partial justification for recently submitting to Congress a draft law which would (1) extend the present 3-mile limit of Argentina's territorial sea to 6 miles, and (2) declare exclusive Argentine sovereignty, and thereby the applicability of Argentine police and customs powers, over the entire contiguous Continental Shelf and epicontinental water, and declare exclusive rights to exploring and exploiting the natural resources (including fish) in that extensive area.

4. Increasing retail fish prices were recently studied by the National and Buenos Aires Municipal authorities. They were termed unjustifiable and the result of a producers' "fish monopoly" in Mar del Plata artificially reducing output and of wholesalers in Buenos Aires exacting enormous profit margins. Price controls were subsequently applied by the government. In order to increase fish consumption, the Buenos Aires Municipality committed itself to construct fish stands in lower-income neighborhoods for the sale of fish at "reasonable" prices.

5. The presentation to the Argentine Congress of an Executive Branch proposal for a comprehensive law promoting and protecting all aspects and sectors of the Argentine fishing industry was expected. (United States Embassy, Buenos Aires, August 20, 1964.)

Note: See Commercial Fisheries Review, July 1964 p. 45; December 1963 p. 54; November 1963 p. 54.

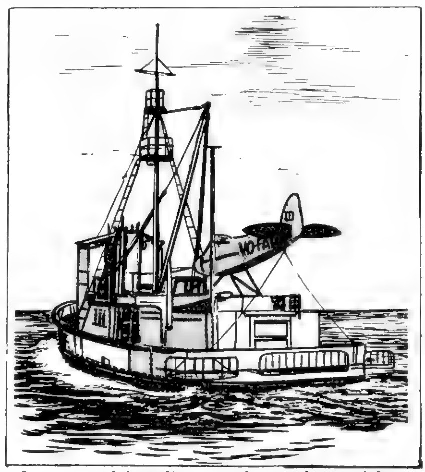
Australia

FACILITIES EXPANDED TO HANDLE INCREASED TUNA CATCH:

To cope with the growing Australian tuna catch, a fishermen's cooperative in South Australia is expanding its activities in Victoria and New South Wales. The cooperative's general manager announced that his organization, together with a Melbourne firm, is taking over a large Melbourne fish cannery. He said they also would build brine tank fish-holding facilities at Eden in New South Wales to allow tuna to be handled in good condition at Eden and transported to Melbourne for canning.

The Melbourne cannery is capable of freezing 100 metric tons of tuna every 36 hours, and will hold in cold storage more than 300 tons. Arrangements have also been made with a public cold-storage plant in Melbourne to store much larger quantities.

The firms involved will form a subsidiary company to operate the Melbourne cannery, handling bluefin tuna from Eden, skipjack from Victoria, and Victorian-caught "salmon" and barracouta.



Stern view of Australian tuna clipper, showing fishing racks and live-bait tanks. Spotting plane fitted with floats on top of tanks.

The brine-tank facilities at Eden will have a capacity of 100 tons. At the end of the New South Wales season, the tanks, which are mo-

Australia (Contd.):

bile, will be transported to Port Lincoln, South Australia, where they will be used to handle the increasing tuna catch there. (Australian Fisheries Newsletter, July 1964.)

* * * * *

JOINT VENTURES WITH JAPANESE IN SHRIMP FARMING AND TUNA FISHING IN AUSTRALIA CONSIDERED:

The shrimp-rearing methods developed in Japan impressed fishery officials of the Western Australian State Government when they visited the island of Shikoku, Japan, in mid-1964. The Western Australian Minister for Fisheries said on his return to Australia that in view of the uncertainty of shrimp stocks at Shark Bay it might be worthwhile to introduce shrimp farming to Western Australia.

At Takamatsu on the island of Shikoku, the Australian officials held discussions with a Japanese scientist who helped develop the technique of shrimp culture. The Japanese scientist said that if it was desired, he could accept an invitation from the Western Australian Government to visit that State to investigate the possibilities of introducing shrimp culture. He already has been to Korea on such a mission. If the project appeared feasible, his company might be prepared to participate in a joint venture in Australia.

The Australian officials said the artificial propagation of shrimp, which is largely a secret process, is being undertaken on a commercial basis on the Japanese island of Shikoku. About 100 tons of artificially-reared shrimp were marketed by the Japanese in 1963.

After hatching, the Japanese cultured shrimp pass through 17 stages in about 28 days before they assume the appearance of shrimp. By that time they are from half to three-quarters of an inch long. At that stage they are sold to farmers who have ponds on the coast where the shrimp are reared to marketable size. The whole process takes slightly less than a year.

The Australian officials also held discussions with a large Japanese fishing company concerning the possibility of developing a joint tuna venture in the Indian Ocean, with Western Australian capital and Japanese vessels, equipment, and if necessary, experienced fishermen. (Australian Fisheries Newsletter, August 1964.)

* * * * *

SHRIMP FISHERY GOOD IN 1964:

Big shrimp landings were reported during May and June 1964 in Queensland, northern New South Wales, and Western Australian waters. Trawlers operating off Moreton Bay, Southport, Tweed Heads, and Brunswick Heads landed about 300,000 pounds of shrimp in a week.

The manager of the Fishermen's Cooperative at Evans Head reported that their intake of shrimp for April-May 1964 was 542,842 pounds compared with 229,336 pounds for the same period in 1963.

The Cooperative's shrimp landings from June 1, 1963, to May 31, 1964, were 920,468 pounds compared with 1,142,034 pounds in the previous year. The manager of the Cooperative said that this slight drop in production was not significant because in 1962/63 trawlers operating south of Evans Head brought in large quantities of small shrimp. During the 1964 season the shrimp were larger and of better quality. As many as 37 vessels were based on Evans Head for the shrimp season, he said.

At Shark Bay, in Western Australia, where the season is later than on the East Coast, a catch of one million pounds for the season was forecast.

Most of Australia's large shrimp are exported to Japan, France, and the United States. The total shrimp catch in 1963 was 12,614,028 pounds, and exports were worth £479,000 (US$1.1 million). (Australian Fisheries Newsletter, July 1964.)

* * * * *

INCREASE IN SCALLOP EXPORTS PLANNED:

With Australian scallop production in 1963/64 substantially increased by the opening up of new beds in Victoria, the need to increase scallop exports became apparent. At the request of the Tasmanian Sea Fisheries Advisory Board, the Fisheries Branch of Australia's Department of Primary Industry undertook a survey of possible overseas markets. Australian Trade Commissioners overseas were asked for the latest "on the spot" market evaluations, and the information they supplied has been incorporated in a full report to be made available soon.

Preliminary investigations on the export potential of Australian scallops were reported most encouraging, and some indication of the general prospects in selected countries follows:

Australia (Contd.):

France: There has been a rapid expansion in the quantity of scallop exports from Australia to France in the past two years. Prospects are excellent for further expansion because consumption of scallops has increased, and local production has not increased at a corresponding rate.

Belgium: Traditionally, Belgium has been supplied by France, although the increased demand has led Belgium to look for new sources of supply. The main outlet is the hotel and restaurant trade where scallops traditionally are an accepted "menu item."

Malaysia: There is a good demand for scallops in the former territories of Malaya and Singapore. In the past four years there have been small sales of Australian scallops in that area, and there appears to be some preference for scallops without roe. There is a considerable demand in Malaya for sun-dried scallops for use in soups and gravies.

Pacific Islands: A small but useful market for scallops in the Pacific Islands has existed for some time and generally is confined to small European communities in the main commercial centers. Australia is the main supplier, and increasing sales appear likely. New Caledonia, with a population of 100,000 (predominantly French) offers the best prospects.

United Kingdom: There is an established consumer demand for scallops in the United Kingdom. The market is supplied mainly by local producers, supplemented by imports. Supplies from overseas are in greatest demand between May and August. There is a preference for live in-shell scallops and fresh scallop meats, but there is a ready market for frozen scallops with low counts per pound. Commonwealth preference arrangements give Australia a good opportunity to expand this market.

Greece: There is a marked preference for seafoods in that country. Scallops, although relatively new to Greece, suit the cooking methods of the inhabitants. Australian scallop were to be featured at a food-tasting exhibition at the Scalonica International Fair this September, and later on in Athens.

Hong Kong: In 1963, Hong Kong imported 26,000 pounds of scallops, but Australia's share in the market was insignificant. Efforts have been made to stimulate sales through major retail outlets but hotels and restaurants appear to offer the best prospects. Hong Kong is a popular tourist resort, and it is expected that the demand for scallops will increase. Prices appear satisfactory, and Australian scallops are acceptable in Hong Kong.

Kenya: Scallops generally are acceptable as a seafood in East Africa by the European community. The United Kingdom was the main source of supply in the past. Frozen scallops with roe on them are acceptable and the prices are favorable. It has been suggested that there could be a good market for frozen scallops with the shells packed separately and for canned scallops because of lack of refrigeration in much of East Africa.

Persian Gulf: The only possible outlets are the small oil-rich States, notably Bahrein and Kuwait, where the demand is confined to hotels and restaurants. Present imports are mostly canned scallops from Japan.

West Germany: Scallops are unknown to most West Germans and consumption is confined to a few gourmets. Supplies are obtained from Canada and Ireland, and there is a preference for "roe-on" scallops. There appears to be a possible market for scallop shells for decorative purposes. Scallop prices quoted appear quite attractive, despite the 13-1/2 percent customs tariff.

United States: The world's largest producer and consumer of scallops is the United States; the bulk of its supplies is normally obtained from the local scallop fishery. Some supplies are received from Canada, Japan and U.S.S.R. There is a strong preference for "all-white" scallops (scallops without roe). There have been scallop gluts in the past, which led in 1961 to a major promotional sales campaign. Small quantities of Australian scallops have been marketed in the United States.

Estimated Australian Exports of Scallop Meats, 1960/61-1963/64

Country of Destination	1963/64	1962/63	1961/62	1960/61
	. . . (In Pounds) . . .			
France	651,000	70,300	5,200	4,500
Pacific Islands	22,000	12,400	12,800	6,100
Malaysia	5,000	7,700	3,000	8,500
Other Countries	77,000	900	2,400	900
Total	755,000	91,300	23,400	20,000

Lebanon: Scallops have no great appeal to Arab communities who have conservative food tastes, but there is an established market in the tourist hotel and restaurant trade, particularly in Beirut. Preference is for scallops with roe-on and no trade barriers exist at present. British and American armed forces establishments also offer export prospects.

Venezuela: Although scallops have not been imported in the past by that country, there are prospects for developing a market in catering and supermarket establishments. Businessmen have expressed willingness to consider stocking Australian scallops and developing a regular market. (Australian Fisheries Newsletter, August 1964.)

* * * * *

SCALLOP FISHERY EXPANDS:

With a scallop production of more than 5 million pounds (shell weight) during the 1962/63 season, Australia was the fifth largest scallop producer in the world, following the United States, Japan, Canada, and France. In 1963, the United

Fig. 1 - Queensland scallops average six inches in diameter--much larger than the Tasmanian variety. Upper shell of the Queensland scallop.

Australian (Contd.):

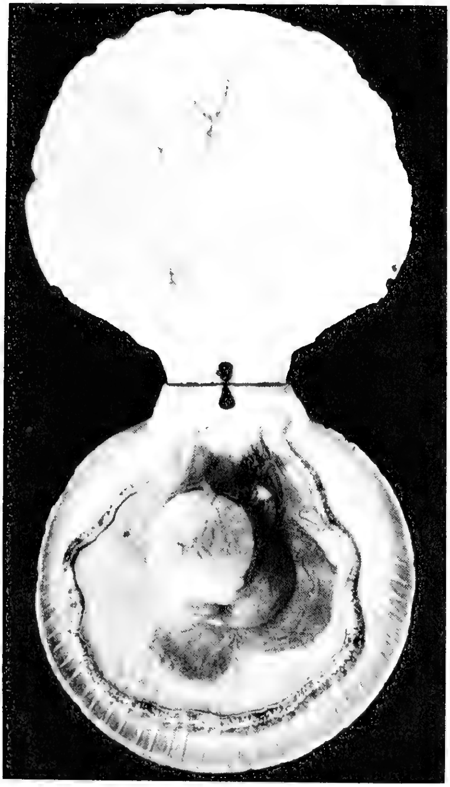


Fig. 2 - A Queensland scallop in its shell, showing the large adductor muscle or meat of the scallop.

States production of scallop meats was about 20 million pounds; in 1962 it was nearly 25 million pounds. The 1962 scallop production of the other countries was (shell weight basis in millions of pounds) Japan 22.3, France 13.7, and Canada 13.9, followed by Australia with 5.1.

Scallop beds exist in a number of regions in Australia, but until recently, commercial production was virtually confined to Tasmania, and to a lesser degree, Queensland. During the 1962/63 season Tasmania produced 90 percent of Australia's total production of a little more than 5 million pounds.

The Tasmanian scallop fishery has a long history extending back before World War I. The greatest expansion was after World War II when the area fished was extended in 1950 from D'Entrecasteaux Channel, near Hobart, to Coles and Norfolk Bays, and subsequently to east coast areas such as Triabunna, Maria Island, St. Helens, and Bicheno.

In 1963 a commercial scallop fishery was established in Victoria, based on beds in Port Phillip Bay, and it has grown

Fig. 3 - A portion of the scallop fishing fleet at the dock in Bundaberg, Queensland.

significantly. In July 1964, 90 vessels were dredging for scallops in Port Phillip Bay. In September 1963, only two vessels were dredging. By February the number of vessels jumped to 40, reached 51 in May, and 90 in June.

April 1964 was the best month for scallop dredging with 42 vessels landing 16,393 bags, each bag containing between 400 and 600 scallops and yielding 17 to 18 pounds of meats. Some of the best individual catches in 1964 were at the rate of 8 to 9 bags an hour (or 4,000 to 4,500 scallops an hour). The best conditioned scallops were taken off Brighton.

Victoria now produces more than 80 percent of Australia's scallop exports which amounted to 755,000 pounds worth about A£180,000 (US$400,000) for the year ended June 30, 1964.

The Tasmanian scallop fishing season opened on May 14, 1964, and the best results were on east coast beds.

The D'Entrecasteaux beds, which for many years were the main source of supply, have declined and because of the poor quality of the scallops are not being fished.

Interest now is centered on the east coast, from Maria Island to Eddystone Point, where a Tasmanian exploratory fishing vessel has assisted by locating new beds and will continue to do so. Although fishing activity has been hampered at times by rough weather, catch rates on east coast beds have been good, and the scallops are of consistently high quality. A fleet of 60 vessels is operating in that area, taking scallops in from 20 to 30 fathoms of water from a clean sea bed. (Australian Fisheries Newsletter, August 1964.)

Note: See Commercial Fisheries Review, October 1964 p. 87.

* * * * *

Australia (Contd.):

EXPORTING PET FOOD TO THE UNITED STATES:

The first Australian export shipment of pet food (prepared from fishery products) was loaded in July 1964 at Port Lincoln, South Australia, for United States delivery. The 300-ton shipment consisted of 25,000 cases valued at about Ł50,000 (US$111,100). The pet food was packed at a Port Lincoln cannery. (Australian Fisheries Newsletter, August 1964.)

* * * * *

STANDARDS FOR OYSTERS PROPOSED:

In Australia, the New South Wales State Department of Public Health proposes to set bacteriological standards for the sale of oysters for human consumption. It is hoped that the new standards will help open new export markets.

For many years, oyster bacteriological standards have been in effect in various other countries. The main method of cleansing oysters has been ultraviolet light.

When the New South Wales Oyster Farmers' Association was informed of the proposal to establish a bacteriological standard, it sought information from the British Ministry of Agriculture on procedures to adopt in cleansing the oysters. British experts supplied plans and specifications for a modern ultraviolet treatment plant.

An Australian oyster supply firm built a trial plant on Georges River to apply the ultraviolet treatment. After three months of continuous operation, the trial plant was reported to be performing satisfactorily. Treated oysters conformed to a bacteriological standard likely to be established. The treated oysters suffered no impairment of flavor or texture. Oyster treatment costs worked out at about 10 shillings (US$1.11) a bag.

While the plant operated, oystermen were invited to inspect it; they were shown how it worked and given the plans and specifications of the facility.

A newly formed company plans to build another ultraviolet treatment plant in Sydney, Australia.

The annual New South Wales oyster harvest is in excess of 12,000,000 pounds (weight with shell) with a value of Ł1 million ($2.2 million), according to reports. (Australian Fisheries Newsletter, July 1964.)

Canada

FEDERAL-PROVINCIAL BRITISH COLUMBIA FISHERIES COMMITTEE ESTABLISHED:

The study of fisheries problems on Canada's west coast will be facilitated by a new Canadian Federal-Provincial committee which held its organizational meeting in Nanaimo, British Columbia, August 19, 1964. The initial members of the committee are the Deputy Minister of the British Columbia Department of Recreation and Conservation and the Deputy Minister of Fisheries for Canada. The Deputy Ministers will each name two additional members from Federal and Provincial agencies to bring the committee to full strength.

The next meeting of the committee will be held at Ottawa in early November 1964. Among the problems expected to be brought before the committee at that meeting are those of the West Coast oyster industry, the maintenance and improvement of salmon spawning streams in the face of industrial expansion, and the relationship of sport and commercial fisheries in British Columbia. (Canadian Department of Fisheries, Pacific Area, August 19, 1964.)

* * * * *

FEDERAL-PROVINCIAL ATLANTIC FISHERIES COMMITTEE MEETING IN OTTAWA:

Problems affecting Canada's Atlantic fisheries were discussed at the sixth annual meeting of the Canadian Federal-Provincial Atlantic Fisheries Committee, which is made up of Federal and Provincial deputy ministers with responsibilities for fisheries in the five Canadian Atlantic Provinces. The meeting was opened September 1, 1964, by the Federal Deputy Minister of Fisheries who stressed the value of frank exchanges of views in planning new joint projects.

Subjects discussed at the meeting included Canada's participation in international conservation programs for the Northwest Atlantic; territorial waters and Canada's exclusive fishing zone; fisheries training and marine works in the Atlantic provinces; financial assistance and inspection programs; and marketing organizations. Progress reports were submitted on the proposed Canadian Atlantic Fishing Trawler Conference, and on programs for industrial development. The Committee also received reports from its special sections dealing with salmon, trout, and oysters. (Canadian Department of Fisheries, Ottawa, September 1, 1964.)

* * * * *

NEW CHART OF NOVA SCOTIA FISHING BANKS:

A new type of Canadian chart--a fisheries chart--has been issued by the Canadian Hydrographic Service.

Canada (Contd.):

The new chart, No. 4041, covers the Atlantic Coast banks of Banquereau and Misaine, which lie off Nova Scotia between Scatarie and Sable Islands. It is essentially an accurate detailed picture of the shape and depth of the sea bottom enabling fishermen to select the most favorable areas and banks for fishing. The chart is drawn on a scale of 1:300,000, or about 4 miles to the inch, and is thus 4 times the scale of previous Canadian charts covering the area.

Through the use of a small contour interval, the new chart helps fishermen pick out likely areas to fish and avoid those areas where the bottom is uneven. It illustrates depths primarily by contour lines. The contours are shown as a solid blue line spaced at 10-fathom intervals to a depth of 100 fathoms; at 20-fathom intervals to 200 fathoms; and thereafter at every 100 fathoms to a depth of 1,000 fathoms.

General depths are indicated by three shades of blue. Depths of less than 10 fathoms are shown as a dark blue; the extensive fishing banks, of between 10 and 50 fathoms of water, by a medium blue; and the areas containing over 50 but less than 100 fathoms, by a light blue.

The new chart is available in two versions: L(D6)4041, which shows the decca lattice for the Cabot Strait chain; and 4041-L, which shows the 3 loran rates covering the area. Each version is available (price $2.00 each) either from chart dealers or from the Marine Distribution Office, Canadian Department of Mines and Technical Surveys, Ottawa, Canada.

Ceylon

PROPOSED GOVERNMENT FISHERIES CORPORATION MAY LEAD TO FISHERIES EXPANSION:

A proposal to establish a Government-managed Fisheries Corporation was reported in the official Ceylon News-Letter, July 24, 1964. Designed to increase domestic fisheries production, the proposal would also involve a reorganization of the Ceylonese Fisheries Department. All commercial fishing projects of that Department would be transferred to the Fisheries Corporation.

The functions of the Fisheries Corporation would be: (1) commercial fishing, including deep-sea trawling; (2) fish processing, including canning and drying, either directly or through authorized agents; (3) distributing fish through wholesale and retail markets, either directly or through authorized agents; and (4) building and maintaining harbors and shore facilities including cold-storage plants.

Under the proposed reorganization, the functions of the Fisheries Department would be: (1) fisheries regulation under Ceylonese Fisheries Ordinance; (2) fisheries research; (3) fisheries extension work; and (4) miscellaneous service activities such as administration of the vessel loan program, and maintenance of repair facilities and housing for fishermen.

All the assets of the Fisheries Department used or intended for use in commercial activities would be transferred to the Fisheries Corporation. In addition, funds provided for the commercial activities of the Fisheries Department for fiscal years 1963/64 and 1964/65 would be transferred to the Corporation. The Corporation would also receive Rs. 3.5 million (US$736,000) as initial working capital from the 1964/65 budget of the Ceylonese Government.

Ceylonese fishermen launch their shallow log raft teppans. Tests have proved that these craft, which can slide over coral and sand reefs and budge ashore on any beach, can catch more fish if mechanized with outboard engines.

The Fisheries Corporation presumably would take over certain fishing vessels which may be delivered by foreign shipyards. Ceylon has ordered 5 trawlers from Yugoslavia, but because of technical difficulties only 1 may actually be purchased. Ceylon is also trying to buy 10 new tuna fishing vessels abroad.

Ceylon (Contd.):

Ceylonese fishery imports, valued at about Rs. 61 million ($12.8 million) in 1963, are a drain on the country's foreign exchange. That provides a strong incentive to increase domestic fishery landings. The Fisheries Corporation was still in the planning stage when it was mentioned in the Ceylon News-Letter. However, in September 1964 the Ceylonese Minister of Agriculture, Food, and Fisheries was reported to be seeking Cabinet authority for the establishment of the Fisheries Corporation under the State Industrial Corporation Act. If established as planned, it may be necessary for the Fisheries Corporation to obtain advisors from abroad. (United States Embassy, Colombo, September 15, 1964.)

Colombia

FISHERIES TRENDS AND POTENTIAL:

Colombia has access to abundant fishery resources in both the Caribbean Sea and Pacific Ocean, but has not been able to harvest enough fish to meet its domestic requirements. The reasons have been the lack of modern fishing vessels and adequate shore-processing facilities.

The greatest potential for Colombia's commercial fishery is in the waters off the Pacific coast. The Humboldt Current, which produces the environment for the rich Peruvian fishing grounds, is found 200 miles off the coast of Colombia. The intermingling of that cold stream with the warm tropical waters provides an excellent habitat for tuna. Extensive shrimp grounds and large quantities of spiny lobster are found closer to land. The Caribbean fishery harvests a wide variety of tropical fish species such as the snook, snapper, needlefish, yellowfin, shrimp, and sardines.

Colombia has a total of 102 fishing vessels operating on both oceans. The Pacific fleet consists of 53 shrimp vessels and 5 tuna vessels and the Atlantic fleet of 43 general-purpose ships and one shrimp vessel. They are mostly ancient wooden vessels, and both equipment and fishing methods are obsolete.

There are fish-processing plants on both coasts with a concentration of three canneries near the Caribbean ports of Barranquilla and

In Colombia fish are transported to Barranquilla for marketing by canoe down the Magdalena River.

Santa Marta. They process yellowfin, bonito, albacore tuna, and sardines. Plants on the Pacific coast at Buenaventura and Tumaco process tuna, shrimp, and spiny lobster. Fresh fish are sold locally on the coast and iced fish are flown inland and sold as a luxury item in the cities. The only fish meal produced in Colombia is from the waste of canning operations, as the underequipped fishing fleets are able to supply just enough fish to keep the canneries at half capacity.

The price of fresh fish in Colombia's inland cities is often double that of beef and other fresh meats. Since the fishing industry enjoys absolute protection from imports, a large internal market could be developed for frozen fishery products if prices were competitive with those of fresh meat. Surface transportation with refrigeration facilities would probably mean a greater demand. There are freezing facilities already at some of the shore locations, but those were not being used.

Both government and private interests have been looking for a way of increasing the country's fishery catches. The vessels being used are usually owner-operated and inefficient, but steel vessels under coordinated management, using electronic techniques and with up-to-date equipment and refrigerated storage, could increase landings significantly.

The Colombian Government has declared the fisheries a basic industry, and has granted tax waivers to fisheries firms. In April 1963, the Second National Fisheries Congress drew up a ten-point program for developing the fishing industry. Its main purpose was to provide a basis for a new Department of Fish-

Colombia (Contd.):

eries, but it also recommended the extension of territorial waters to 200 miles and the restriction of fishing within this area to Colombian vessels. Fishing cooperatives and government credit facilities were also recommended.

It was reported that Colombian fishing companies would welcome joint ventures to provide capital and technical assistance, and Japan has already provided a vessel for fisheries research on the Pacific coast. Also, Colombian shipbuilders were said to be interested in forming licensing arrangements with foreign companies for building new types of fishing vessels and importing modern fish ing gear. The types of vessels needed are in the 50- to 70-foot class, equipped for shrimp fishing, long-lining for tuna, and trawling for sardines and small fish. In line with the Colombian policy of national development, the import of complete vessels would not be permitted. Construction and assembly of component vessel parts in local shipyards would be a primary requirement for any firm wishing to supply equipment.

Colombia exported practically no fishery products before 1949, and in 1962 shipped 942 metric tons to the United States out of a total catch of 42,500 metric tons. Exports now consist mainly of frozen or iced shrimp for the United States market.

The Latin American Free Trade Area (LAFTA) also presents a potential export market for Colombian fishery products. However, most of the LAFTA countries have fisheries equal to those of Colombia, so export success could depend on having facilities for packaging and shipping frozen products.

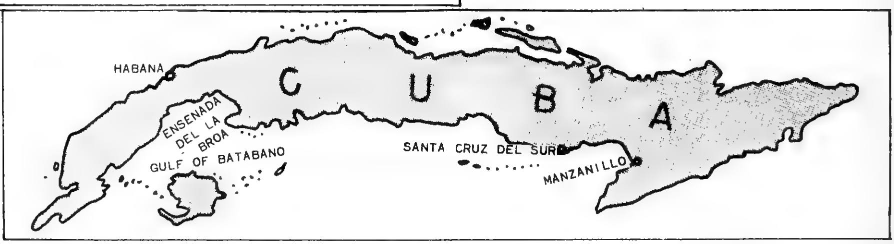
Colombia's natural resources, coupled with a large local market and possibilities for exports (particularly of fresh and frozen shellfish), indicate that the Colombian fishing industry is entering a dynamic phase of development and may soon become an important segment of that country's economy. (Department of Trade and Commerce, Ottawa, August 22, 1964.)

Cuba

CATCH AND FISHING FLEET EXPANDED:

Cuba's fisheries are expanding in the direction of state-operated fishing fleets, according to an official Cuban report. Those fleets include large trawlers, long-line tuna vessels, and other vessels capable of high-seas operations. In 1963, the state-operated fisheries produced a catch of 12,112 metric tons or about 30 percent of Cuba's total fishery landings. In 1962, the initial year those fisheries were operated by the state, production was 2,558 tons or about 7 percent of total production.

Traditionally, the Cuban fishing fleet has been limited to coastal waters with the exception of a few old schooners. The majority of Cuba's 12,000 fishermen still operate their small craft in coastal waters and the Cuban Government has organized them into fishery cooperatives. Most of the Cuban fishery catch is taken by their 3,800 small boats (under 100 gross tons).



Cuba's state-operated fishing fleet consists of 22 vessels: (1) 5 tuna vessels of 350 gross tons which were built in Japan; (2) 15 trawlers (742-gross-ton refrigerated stern trawlers built in East Germany but supplied by the U.S.S.R.);

Cuban Marine Fish Landings by Type of Fishery, 1960-1963

Fishery	1963	1962	1961	1960
	. .	.(Metric Tons).	. .	
Coastal 1/	25,400	27,891	22,361	22,341
Offshore:				
Trawlers	13,624	6,374	4,772	4,449
Long-liners 2/	3,089	1,606	3,298	3,735
Total	3/ 42,113	35,871	30,431	30,525

1/Principally snappers and groupers.
2/Principally skipjack and blackfin tuna.
3/Includes catch of 7,203 metric tons by the 10 medium-size refrigerator stern trawlers supplied under the Cuban-U.S.S.R. Fishing Agreement; 5 additional trawlers were given to Cuba. In 1963, those Havana-based vessels were manned partly by Cubans.

Cuba (Contd.):

and (3) 2 trawlers (medium-size types built in Poland). Ten of the refrigerated stern trawlers still belong to the U.S.S.R. and are used to train Cuban crews. In addition, wooden fishing boats of the Lambda class (97 gross tons) and smaller are included in the production of state-operated fisheries. Tuna long-lining is conducted throughout the Caribbean and off Brazil; trawling is conducted in the North Atlantic between 32° and 43° N. latitude off the Middle Atlantic States and on the Campeche Bank. (Las Pesquerias Cubanas, February 1964.)

Denmark

NEW FISHERIES ATTACHE APPOINTED FOR U. S. AND CANADA:

The position as Danish Fisheries Attache for the United States and Canada, with headquarters in New York City at the Consulate General of Denmark, was filled about November 1, 1964. The position had been vacant since April 1963. The new Fisheries Attache, Erling Hulgaard, was chosen for the post by Denmark's Ministry of Fisheries. His primary duties will be to increase the sale of Danish fishery products in the United States and Canada. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, September 3, 1964.)

France

SHIPYARDS RECEIVE ORDERS FROM SOVIETS FOR FISHERY FACTORYSHIPS AND FROM SOUTH KOREA FOR TRAWLERS:

An order for three modern fishery factoryships costing a total of US$20.4 million was received in mid-1964 by a shipyard in Nantes, France, from the U.S.S.R. for the Soviet fishing industry.

Each vessel is to be specially equipped for fishing and processing sardines and herring and will have a daily production capacity of 100,000 cans on a 12-hours-a-day basis. The cans will be stocked in separate holds with a total capacity of 70,600 cubic feet (space for 4,750,000 cans). The fish in bulk will be deep-frozen and stocked in a special 26,000-cubic-foot hold. The vessels will also make fish oil and fish meal.

Another order obtained by French shipbuilders at Le Havre is for 48 trawlers destined for South Korea. Another order from South Korea calls for 7 tuna vessels, 3 trawlers, and 1 refrigerated vessel.

It was reported that out of 88 vessels completed by French shipyards in 1963, 47 were fishing vessels. During the same year, 42 fishing vessels were launched in France out of a total of 86, and among the 88 keels laid, 39 were for fishing vessels. (Fish Trades Gazette, August 8, 1964.)

German Federal Republic

NEW FISH-GUTTING MACHINE OFFERED BY FIRM:

A new fish-gutting and beheading machine is being marketed by a West German manufacturer of fish-processing machinery. The new machine is said to be able to handle ocean perch ranging in length from 12 to 22 inches and various other groundfish ranging in length from 14 to 31 inches. The new machine can be adjusted to handle between 25 and 40 fish per minute. It requires only one attendant; his job is to place fish on an infeed conveyor. The machine then automatically heads and guts the fish, removes entrails, and cleans the belly cavity of the fish. The headed and gutted fish leave the machine on an automatic conveyor.

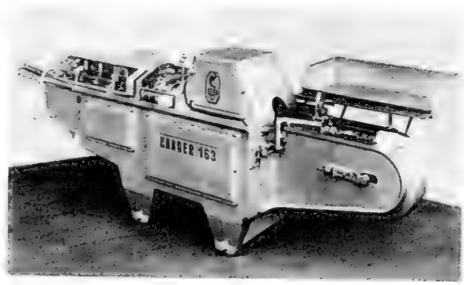


Fig. 1 - A new fish-gutting and beheading machine marketed by a West German manufacturer.

The machine works in a straight line. Its approximate dimensions are length 15 feet, 10 inches; width 3 feet, 7 inches; and maximum height 5 feet, 4 inches. The housings and the frame of the machine are designed to allow an offal conveyor to be placed underneath. The power requirements of the machine are 3 kilowatts.

German Federal Republic (Contd.):

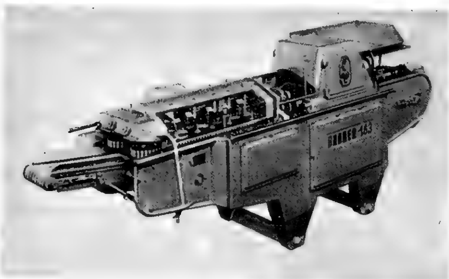


Fig. 2 - Design of the base of the new fish-gutting machine allows for a conveyor to be placed underneath the machine for removal of the offal. The handle on the left hand side permits the tilting and lifting of the upper assembly for better access to the cutting tools for maintenance and cleaning.

The machine is built for heavy duty use, particularly on board fishing vessels. The first production model of the new machine is now in use aboard a German trawler.

Ghana

TECHNICAL FISHERIES ASSISTANCE BY SOVIETS:

The Soviet Union was reported planning to send specialists to Ghana to study the economics of the construction of a fishing harbor in Miemia, and improvement of fishing harbors at Takoradi and Elmina.

The Soviets also planned to send a floating drydock to Ghana for use in repairing their trawlers operating there. In December 1963, 10 of the 17 large trawlers operating off Ghana were reported to be of Soviet registry.

A total of 118 Ghanaian students has already been sent to the Soviet Union for training in fisheries. It was believed they would remain there for 3 to 4 years as they have to learn the language before their fisheries training begins.

A fish cannery was reported being built in Ghana by the Soviets this past summer, and that ground for it had already been broken. (Fishery Attache, United States Embassy, Abidjan, August 13, 1964.)

Note: See Commercial Fisheries Review, March 1964 p. 54.

Greece

ATLANTIC FREEZER-TRAWLER FISHERY TRENDS, JANUARY-JUNE 1964:

During June 1964, a total of 6 Greek freezer-trawlers and 1 refrigerated transport vessel returned from Atlantic operations to home ports with 2,343 metric tons of frozen fish as compared with 1,700 tons of frozen fish delivered in June 1963 by 4 freezer-trawlers and 3 refrigerated vessels.

In January-June 1964, the Greek fleet of freezer-trawlers and carrier vessels operating in the Atlantic landed 9,650 tons of frozen fish in Greek ports, up only 2.7 percent from landings of 9,395 tons in the same period of 1963. In the first half of 1962, the Greek Atlantic fleet delivered 7,481 tons of frozen fish.

Although the total landings in January-June 1964 showed a small gain, average landings by individual vessels were down somewhat from the previous year. (The gain in Atlantic frozen fish landings did not keep pace with the expansion of the Atlantic fleet.) The drop in average landings in 1964 was attributed to a decline in the catch on fishing grounds off Mauritania. In early July 1964, the Greek Atlantic refrigerated fishing fleet (trawlers and transports) included 34 units of which 21 were on active service and 13 were undergoing repair and reconstruction.

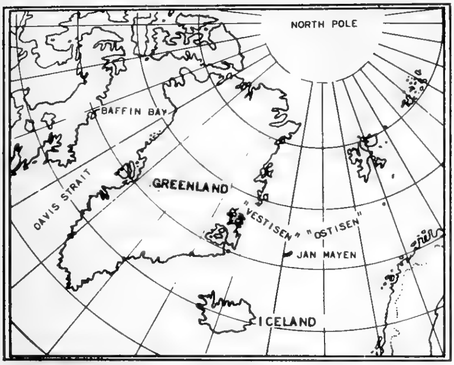
In regard to Government policy affecting Greek Atlantic freezer-trawler operations, the Union of Hellenic Overseas Fishing Enterprises has submitted a detailed memorandum to the Greek Minister of Industry. The memorandum points out that a Greek fleet of 23 active freezer-trawlers could be expected under normal conditions to produce annual landings of 26,000 tons of frozen fish with a value of Dr.300 million (US$10 million). The memorandum then called for the "creation of competitive conditions" for the Atlantic freezer-trawlers. Among other things, it asked for a reduction in the interest rate on fishery loans by Greek commercial banks. It was stated that charges on Greek fishery loans were considerably above average rates in the European Common Market. In the field of marketing, the memorandum referred to the general management of market price control at the Greek Trade Ministry and requested that domestic frozen fish landings be placed on a competitive basis with imported frozen fish. (Alieia, July 1964.)

Greenland

12-MILE FISHING LIMITS MODIFIED TO CONTINUE CERTAIN HISTORIC FISHING RIGHTS OF OTHER COUNTRIES:

When Greenland's fishing limits were extended from 3 to 12 miles on June 1, 1963, certain concessions were made to the historic fishing rights of France, Iceland, Norway, Portugal, Spain, the United Kingdom, and West Germany. Permission has now been granted to fishing vessels registered in those countries to fish with long lines and hand lines and to transfer catches up to Greenland's 3-mile limit until October 31, 1968 (Decree 227 issued by the Danish Ministry for Greenland, July 3, 1964). This represents a 5-year extension of a concession originally granted by Danish Ministry For Greenland Announcement Number 193, May 27, 1963. (Regional Fisher-

Greenland (Contd.):



ies Attache for Europe, United States Embassy, Copenhagen, August 12, 1964.)

Note: See Commercial Fisheries Review, August 1963 p. 88.

* * * * *

HALIBUT FISHERY TRENDS, 1963:

Landings of Greenland halibut in 1963, handled by the Royal Greenland Trading Department (RGTD), totaled 1,906 metric tons as compared with 1,302 tons in 1962. Except for incidental catches in shrimp trawls, Greenland halibut are taken mainly by long line in clay bottoms, often in fjords with glaciers. In winter the long-line fishery is conducted through the ice.

The greater part of the Greenland halibut catch is from the Jakobshavn district which in 1963 accounted for about half the total landings of that species. Most of the halibut catch is handled by the government RGTD which processes it as frozen fillets and salted halibut. Since 1962, more of the halibut catch has been frozen than salted.

Salted Greenland halibut is sliced thinly, colored a salmon shade, lightly smoked, canned in oil and marketed as "solaks" (sea salmon), an imitation smoked salmon. It is reported that only the salted product takes color well. However, the demand has been growing for frozen Greenland halibut that is sliced and uncolored, lightly smoked, and packed in film bags. The United States market for frozen halibut fillets also is being tested. Belgian buyers favor Greenland halibut that is cut to their own specifications. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, August 26, 1964.)

Table 1 - Greenland Halibut Landings for RGTD by District, 1963

District	Summer Fishery	Winter Fishery	Other	Total
	. . . . .(Metric Tons). . . .			
Julianehaab	4.8	-	-	4.8
Narssaq	25.5	-	-	25.5
Frederikshaab .	36.5	-	-	36.5
Godthaab.	12.7	244.0	12.8	269.5
Sukkertoppen . .	45.6	-	-	45.6
Holsteinsborg . .	22.3	-	12.3	34.6
Egedesminde . .	6.4	-	-	6.4
Christianshaab .	50.3	114.5	-	164.8
Jakobshavn . . .	630.0	281.6	7.8	919.4
Umanak	138.6	232.5	15.7	386.8
Upernavik	-	-	12.1	12.1
Total 1963 . . .	972.7	872.6	60.7	1,906.0
Total 1962 . . .	468.3	717.2	116.2	1,301.7

Source: Royal Greenland Trade Department, Copenhagen.

Table 2 - Greenland Halibut (Frozen Fillets and Salted) Exports by RGTD, 1963

Type and Country	Quantity	Value	
	Metric Tons	Kroner	US$
Frozen halibut fillets:			
Belgium	202	661,934	95,980
Denmark	164	406,311	58,915
United States	58	227,734	33,021
West Germany and Sweden	46	127,698	18,517
Total	470	1,423,677	206,433
Salted halibut:			
Denmark	221	846,770	122,782
Belgium	12	32,238	4,675
Total	233	879,008	127,457
Grand total	703	2,302,685	333,890

Note: Values converted on basis of one Danish krone equals US$0.145.
Source: Royal Greenland Trade Department, Copenhagen.

* * * * *

SHRIMP FISHERY TRENDS, 1963-1964:

Greenland's shrimp fishery is its second most important fishery, accounting for 7 percent of the total fishery catch in 1962 and 8 percent in 1963. Its steady growth enabled it to surpass the declining ocean catfish fishery in 1962 and 1963. Shrimp are caught entirely by trawls with a mesh of about 20-22 mm. (25/32 to 55/64 inches) knot to knot, on smooth bottoms in depths of 656 to 1,640 feet, mainly in Disko Bay by 15-30 ton cutters with 60-hp. engines. Significant quantities of Greenland halibut and ocean perch are caught with the shrimp. In 1963, the districts of Christianshaab and Jakobshavn accounted for about 70 percent of the total shrimp landings. Shrimp are caught only from May to November in Disko Bay because of ice during the winter. But in Southwest Greenland the boats usually can fish all winter by shifting grounds.

Table 1 - Greenland Shrimp Catch by District and RGTD Utilization, 1963

District	Catch	Processed Shrimp		
		Canned 1/	Jars	Frozen peeled 2/
	Metric Tons	. . . (Number). . .		Metric Tons
Narssaq	282	552,300	-	-
Sukkertoppen	86	-	-	19
Egedesminde	287	-	-	86
Christianshaab	1,459	2,452,100	623,900	-
Jakobshavn	775	-	-	144
Godhavn	206	-	-	50
Total 1963	3,095	3,004,400	623,900	299
Total 1962	3,360	3,654,400	936,000	237

1/Includes 1.4 million units of machine-peeled shrimp in 2.5- to 7-ounce cans, and about 160,000 units of hand-peeled shrimp in 7-ounce cans.
2/Packed in containers from 2½ ounces to 6.6 pounds.
Note: Contents of cans and jars--80 grams (2½-2¾ ounces).
Source: Royal Greenland Trade Department, Copenhagen.

Greenland (Contd.):

Biologists state that overfishing apparently is not a problem in the Greenland shrimp fishery because the trawling grounds are limited compared to the presently unfishable areas in the fjords and along the coasts which would repopulate depleted grounds. Disko Bay trawling grounds are surrounded by very large areas which are not fished. In 1961, trawlers in Disko Bay averaged 880 kilos (1,940 pounds) per day for most of the year. This year (1964) they have been limited to about 300 kilos (661 pounds) per day because of limited plant capacity on shore.

Table 2 - Greenland Shrimp Catch and RGTD Utilization, 1955-63								
			Canned					
Year	Catch	Froz. 1/	Hand-peeled	Machine peeled	Total	No. of cans 2/	No. of jars 2/	Total cans & jars
	.... (Metric Tons)							
1963	3,108	299	188	102	290	3,004,400	623,900	3,628,300
1962	3,362	238	236	132	368	3,654,400	936,000	4,590,400
1961	2,545	125	217	82	299	2,882,000	851,700	3,733,700
1960	1,789	69	175	56	231	2,271,000	612,500	2,883,500
1959	949	34	3/	3/	3/	1,306,200	385,500	1,691,700
1958	759	32	3/	3/	3/	963,700	449,800	1,413,500
1957	670	13	3/	3/	3/	1,025,000	259,800	1,284,800
1956	528	6	3/	3/	3/	800,910	161,000	961,910
1955	564	6	85	-	85	981,300	84,000	1,065,300

1/All peeled except for 30 tons in shell in 1963
2/Number of cans and jars is given in terms of various sizes converted to 80 gram ($2\frac{1}{3}$- to $2\frac{3}{4}$-ounce) size.
3/Not available.
Source: Royal Greenland Trade Department, Copenhagen.

The 1963 shrimp catch was canned and frozen in plants operated by the Royal Greenland Trade Department (RGTD), a part of the Ministry of Greenland, in about equal proportions. Three-year old shrimp may be used by the canneries and freezers but the larger 4- and 5-year old shrimp are preferred. Older year classes are infrequent.

At a typical modern shrimp processing plant in Christianshaab, shrimp trawlers land their catches (90-140 count per pound), only a few hours old and not iced, in 20-kilo (44 pound) boxes. Sorting machines separate the sizes over 6 grams (0.2 oz.) for hand peeling and those between 3 and 6 grams (0.1-0.2 oz.) for machine peeling in United States-built equipment. The former size is cooked and hand-peeled as quickly as possible whereas the latter usually is iced and held for easier machine peeling, uncooked, after storage. For hand peeling, the shrimp are cooked 3-1/2 minutes (automatically timed) in boiling water with 2 percent salt added. Female peelers average about 2 to 2-1/2 kilos (4.4 to 5.5 pounds) an hour, getting about a 25-percent yield. Hand packers average about 100 glass jars an hour and about the same rate for labeled cans of the same size (2-1/2-2-3/4 ounces). The shrimp are packed evenly in alignment on the bottom and sides of the containers. The brine added contains 1 percent citric acid, 4 percent salt, and 2 percent sugar, but no monosodium glutamate. The jars are vacuum-sealed but not the cans. The cans are packed 48 to a fiberboard carton. A carton contains 12 jars with 4 cartons to a master container. The overall yield from raw shrimp to canned product is about 20 percent.

The iced shrimp for machine peeling may be stored for two days and then blanched with live steam on the feeder board of the machine which averages about 250 kilos (550 pounds) of raw shrimp an hour with a yield of 12-18 percent. The yield from raw shrimp to the canned product is about 15 percent which could be increased to 16 percent or more. For use as frozen shrimp the yield is about 20 percent. (Another plant reported 22-23 percent for hand-peeled shrimp). The cans of machine-peeled shrimp are filled by "throw" filling (2-1/2-4-1/2 ounces), filled with a similar brine containing MSG, and sealed without a vacuum.

At the typical plant in Christianshaab, hand-peeled canned shrimp are cooked one hour at 105° C. (221° F.), machine-peeled at the same temperature but for 1-1/2 hours because of the storage time before processing. At some other plants, hand-peeled shrimp are packed in 100-gram (about 3.5-ounce) and one-pound film bags and vacuum-sealed before freezing.

Table 3 - Frozen Peeled Shrimp Sold by RGTD in 1963			
Country	Qty.	Value	
	Metric Tons	1,000 kr.	US$ 1,000
United Kingdom	103	1,871	272
Denmark	87	1,744	253
France	39	320	46
West Germany	21	413	60
United States	2	28	4
Other countries	37	718	104
Total	289	5,094	739

Table 4 - Canned and Preserved Shrimp Sold by RGTD in 1963								
Country	Cans			Jars			Total Value	
	Qty.	Value		Qty.	Value			
	In 1,000	1,000 kr.	US$ 1,000	In 1,000	1,000 kr.	US$ 1,000	1,000 kr.	US$ 1,000
Denmark	1,214	2,545	369	23	41	6	2,586	375
United States	557	701	102	109	246	36	947	138
W. Germany	86	168	24	247	540	78	708	102
United Kingdom	118	212	31	69	159	23	371	54
65 other countries	395	626	91	369	808	117	1,434	208
Totals	2,370	4,252	617	817	1,794	260	6,046	877

Source: Royal Greenland Trade Department, Copenhagen.
Note: Value converted on basis of one Danish krone equals US$0.145.

Greenland (Contd.):

For the future, consideration is being given by shrimp processing plants to methods of removing some shell parts of the shrimp prior to hand-peeling to increase the output. Thought has also been given to holding the shrimp in wells in the vessels, bringing them alive to the plant, pumping them ashore, sorting them quickly by size, and holding them in salt water. Neither of those innovations has been put into use yet.

In 1963, private enterprises in Greenland handled 234 metric tons of shrimp as compared with 3,108 tons by the RGTD. In 1963, RGTD sold shrimp fishery products valued at 11.1 million kroner (US$1.6 million). (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, August 26, 1964.)

* * * * *

OCEAN CATFISH FISHERY, 1963:

Greenland's landings of ocean catfish in 1963, handled by the Royal Greenland Trade Department (RGTD), amounted to 2,400 metric tons, a 41-percent increase as compared with 1,700 tons landed in the previous year but 46 percent lower than the record 1957 ocean catfish landings of 4,450 tons. Landings of that species continued lower each year since 1957 through 1962 but were a little higher the following year. Biologists believe the decline may be due to depletion of local stocks near the coast.

Ocean catfish are caught along the West Greenland coast as far north as Upernavik and to Angmagssalik in East Greenland. The most important fishery is off Sukkertoppen where ocean catfish are fished by long line in depths of about 984 to 1,312 feet inside Little Hellefiske Bank. There is a smaller fishery in the Egedesminde district. Spotted, striped, and blue ocean catfish are found in Greenland waters but only the spotted species is of commercial importance. The blue species has watery meat which makes it unsuitable as a food fish, and the striped species (*Anarhichas lupus* L.) is smaller than the spotted species and less abundant.

Greenland's catch of ocean catfish is processed into fillets and frozen for export as it is highly favored as an export item.

Private enterprises in Greenland utilized 358 tons of ocean catfish (including some ocean perch) in 1963 as compared with 2,400 tons handled by the Government RGTD. In 1963 the RGTD exported 459 tons of ocean catfish fillets (value US$246,000) to the United States and 10 tons (value $5,000) to Sweden. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, August 26, 1964.)

Iceland

EXPORTS OF FISHERY PRODUCTS, JANUARY-JUNE 1964:

During January-June 1964, there was an increase in exports of frozen salted fish (uncured), frozen fish fillets, cod-liver oil, and fish meal as compared with the same period in 1963, according to the Icelandic periodical *Hagtidindi*, July 1964. Exports of herring on ice, frozen herring, and herring oil showed a considerable decrease in the first 6 months of 1964.

Icelandic Fishery Exports, January-June 1964 with Comparisons

Product	Jan.-June 1964			Jan.-June 1963		
	Qty.	Value f.o.b.		Qty.	Value f.o.b.	
	Metric Tons	1,000 kr.	US$ 1,000	Metric Tons	1,000 kr.	US$ 1,000
Salted fish, dried	640	16,569	384	1,411	28,467	660
Salted fish, uncured	19,121	298,719	6,930	14,446	185,887	4,313
Salted fish fillets	846	11,821	274	767	8,877	206
Wings, salted	1,130	14,270	331	1,402	17,499	406
Stockfish	4,501	125,157	2,904	3,034	81,538	1,892
Herring on ice	19	140	3	7,224	23,417	543
Other fish on ice	16,847	96,275	2,234	17,753	90,360	2,096
Herring, frozen	13,106	77,806	1,805	24,212	131,593	3,053
Other frozen fish, whole	1,551	14,408	334	1,612	18,698	434
Frozen fish fillets	30,987	617,250	14,320	28,668	522,645	12,125
Shrimp and lobster, frozen	372	34,276	795	180	17,876	415
Roes, frozen	1,030	17,415	404	659	10,497	244
Canned fish	149	8,534	198	105	6,622	154
Cod-liver oil	6,365	56,670	1,315	4,609	31,749	737
Lumpfish roes, salted	383	9,526	221	218	3,568	83
Other roes for food, salted	2,606	39,053	906	3,176	44,919	1,042
Roes for bait, salted	1,675	14,013	325	974	7,203	167
Herring, salted	14,066	140,255	3,254	17,520	166,658	3,866
Herring oil	9,492	73,555	1,706	15,614	62,717	1,455
Ocean perch oil	28	188	4	116	515	12
Whale oil	2,101	18,675	433	2,035	11,042	256
Fish meal	22,212	138,697	3,218	5,614	33,294	772
Herring meal	31,640	178,138	4,133	32,368	198,149	4,597
Ocean perch meal	255	1,475	34	956	4,479	104
Wastes of fish, frozen	1,919	7,142	166	1,095	3,295	76
Liver meal	307	2,032	47	283	1,970	46
Lobster and shrimp meal	87	346	8	-	-	-
Whale meal	780	4,315	100	100	558	13
Whale meat, frozen	522	4,201	97	838	5,887	137

Note: Values converted at rate of 1 krona equals 2.32 U.S. cents.

* * * * *

FISHERY LANDINGS BY PRINCIPAL SPECIES, JANUARY-APRIL 1964:

Species	Jan.-April	
	1964	1963
	. . .(Metric Tons) . . .	
Cod	219,196	142,221
Haddock	22,983	20,883
Saithe	11,515	4,663
Ling	2,636	3,432
Wolffish (catfish) .	5,698	9,111
Cusk	2,665	4,041
Ocean perch	5,049	7,025
Halibut	280	340
Herring	65,028	75,365
Shrimp	89	349
Capelin	8,640	1,077
Other	1,504	1,358
Total	345,283	269,865

Note: Except for herring which are landed round, all fish are drawn weight.
Source: *Aegir*, July 15, 1964.

* * * * *

Iceland (Contd.):

UTILIZATION OF FISHERY PRODUCTS, JANUARY-APRIL 1964:

How Utilized	January-April	
	1964	1963
	. . . . . (Metric Tons)	
Herring[1] for:		
Oil and meal	52,300	51,637
Freezing	9,497	11,925
Salting	3,231	6,348
Fresh on ice	-	5,456
Groundfish[2] for:		
Fresh on ice	15,180	14,410
Freezing and filleting . . .	109,003	83,080
Salting	72,580	47,731
Stockfish (dried unsalted) .	68,610	41,881
Canning	24	35
Home consumption	4,838	4,919
Oil and meal	1,291	1,013
Capelin for:		
Freezing	133	188
Oil and meal	8,507	889
Shrimp for:		
Freezing	53	267
Canning	36	82
Lobster for:		
Fresh on ice	-	2
Freezing	-	2
Total production	345,283	269,865

1/Whole fish.
2/Drawn fish.
Source: Aegir, July 15, 1964.

* * * * *

LOBSTER PRODUCTS EXPORTS INCREASED:

Iceland is exporting increased quantities of its small lobsters which are fished profitably during the summer only in specific sea areas. The Icelandic Freezing Plants Corporation sells them quick-frozen as "lobster tails" in the United States, usually with the shell, or as "lobster meat" without the shell. In Great Britain, Switzerland, and Italy they are best known as "scampi" or "prawns," and are sold there in a similar way as in the United States.

The packs in which the Icelandic Freezing Plants Corporation exports lobster to those markets are 1-lb., 5-lbs., and 12-lbs. Although most of the Icelandic production goes to various institutions, lobster is increasing in popularity on the normal consumer market. (Iceland Review, Reykjavik, vol. 2, no. 2, 1964.)

* * * * *

NEW TYPE LOBSTER PRODUCT AVAILABLE:

A new type of lobster pack called "boil-in-the-bag lobster" is now available from the Export Branch of the Federation of Icelandic Cooperatives. The lobster is first quick-frozen in airtight cryovac bags and then boiled in the bags, so that it loses none of its delicate flavor or juices. The quality of the lobster is thus preserved.

The new product is available in 225-gram-packs (8-oz.) and is intended both for the United States and the European markets. It was developed in the research department of the Icelandic Federation at Hafnarfjorour in Iceland, which also was responsible for the new processing of Icelandic eel and the production of spiced roes. (Iceland Review, Reykjavik, vol. 2, no. 2, 1964.)

* * * * *

FIRST FISH SAUSAGES PRODUCED:

Iceland recently started making fish sausages, a product that is now available in Icelandic retail stores. They look exactly like meat frankfurters and are lightly smoked, but are made out of haddock and lumpsucker. It is planned to produce the fish sausages for the Icelandic home market only, but later and, depending on their acceptance, it is hoped they may become an export item.

Ireland

FISH MEAL FACTORY PLANNED FOR EAST COAST:

Negotiations for the construction of a new fish meal plant on the east coast of Ireland were reported to be well advanced in the fall of 1964. Fishermen in the area should be able to increase their earnings substantially. Raw material for the plant will be furnished by the recently discovered stocks of sprat and sand eel on the east coast. The plant will also take trash fish, which are now dumped in large quantities.

Export markets are reported to have been negotiated for the planned firm, and the growing poultry industry in Europe is expected to create a continuing demand for Irish fish meal. (The Irish Skipper, September 1964.)

Japan

ALBACORE AND YELLOWFIN EXPORT PRICES:

The export price of Japanese albacore shipped direct from Japan proper to the United States as of early September 1964 was US$370 a short ton c. & f., but sales were reported slow due to lower offers of $360-365 a short ton made by many United States buyers. The ex-vessel albacore price in Japan was holding at around 122 yen a kilogram ($308 a short ton).

Yellowfin tuna exports direct from Japan were transacted at $350 c. & f. a short ton. (Suisan Tsushin, September 8, 1964.)

* * * * *

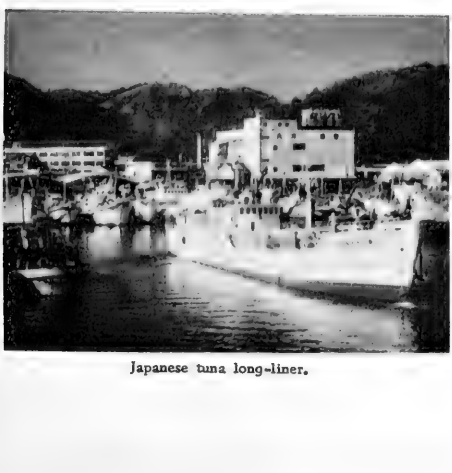
FROZEN TUNA SALES TO U. S. CONTINUED SLOW, JULY-AUGUST 1964:

Japanese frozen tuna exports to the United States were slow during July and August 1964. The slowdown in sales was attributed to good albacore landings by United States fishermen in southern California. Prices of Japanese albacore exported to the United States in July and August declined from US$330 to around US$300 a short ton, f.o.b. Japan. (Suisancho Nippo, August 31, 1964.)

* * * * *

ATLANTIC TUNA FISHERY, AUGUST 1964:

The Japanese Atlantic Ocean albacore fishery was leveling off as of late August 1964 and big-eyed tuna were again dominating the tuna landings, particularly in the fishing grounds off the coast of West Africa. Increased yellowfin catches were also observed. Bluefin, which were taken in considerable quantities during May and June, virtually disappeared during the mid-summer months and were expected to show up again during September and October.



Japanese tuna long-liner.

The frozen tuna market in Italy was reported to be holding steady, but Japanese traders were again showing some concern over the increasing big-eyed catch. The price of Atlantic albacore exports to the United States in August 1964 was US$310 a short ton, f.o.b. Las Palmas. (Suisan Tsushin, August 25, 1964.)

* * * * *

TUNA RESOURCES IN EASTERN PACIFIC TO BE SURVEYED BY RESEARCH VESSEL:

The Japanese Fisheries Agency on September 7, 1964, announced the fiscal year 1964 (April 1964-March 1965) tuna resource investigation program to be conducted by its research vessel Shoyo Maru (604 gross tons). The purpose of the cruise is to cooperate in the tuna resource investigations of the Inter-American Tropical Tuna Commission (IATTC) as well as to expand Japanese data on tuna resources. This year the Shoyo Maru will conduct a close study of the yellowfin tuna resources in the eastern Pacific Ocean.

Japanese research vessel Shoyo Maru to survey tuna resources in Eastern Pacific.

The Shoyo Maru cruise plans are as follows:

1. Three researchers from the Nankai Regional Fisheries Laboratory and the Fisheries Agency, and one assistant from a Japanese university accompanied the cruise.

2. The ship departed from Japan on October 10, 1964, on a 5-months cruise and will return home on March 15, 1965. During the cruise, she is scheduled to call at Pago Pago,

Japan (Contd.):

American Samoa; Papeete, Tahiti Islands; Valparaiso, Chile; Balboa, Panama Canal Zone; San Diego, Calif.; and Honolulu, Hawaii.

3. Research objectives are: (a) study geographical distribution, abundance, catch quantity by fishing ground and hook rate of important fish; (b) conduct gear tests; (c) collect samples of juvenile fish in the central Pacific Ocean area extending 20 degrees north and south of the equator; (d) conduct oceanographic and meteorological studies; (e) conduct biological studies (collect measurements on lengths and weights of fish, study feeding habits, collect data on gonad weights, conduct experiments on artificial fertilization, and collect specimens); (f) tag and release fish; (g) study fishing conditions at ports of call; (h) transmit fishing condition reports daily to Misaki, Shimizu, and Yaizu radio stations. (Suisan Tsushin, September 8, 1964.)

* * * * *

STUDY OF RESOURCE MANAGEMENT PROBLEMS CONFRONTING TUNA FISHING INDUSTRY:

The Japan Federation of Tuna Fishermen's Cooperative Association is studying ways and means of coping with the increasing resource management problems confronting the tuna fishing industry. Opinion is gaining ground within the Association that the scale of vessel operations should be reduced in order to resolve those problems and stabilize the industry.

Yellowfin tuna about to be transferred to a Japanese tuna mothership.

Earlier, the Association had planned to develop a long-range plan in line with the Government's policy of renewing all tuna vessel licenses by 1967. However, in view of the declining tuna resources and worsening labor problems, the Association realized the necessity of developing measures to cope with those immediate problems in order to save vessel owners from possible bankruptcy. Preliminary statistical studies on tuna resources conducted by Professor Morigoro Tauchi (lecturer at the Tokyo Fisheries College) for the Association indicated that overfishing of adult fish in the Atlantic Ocean has seriously threatened reproduction in that ocean. His studies covering other regions can be expected to produce similar findings.

The Association began to study the tuna resource and management problems two years ago at the time when the Fisheries Agency was considering authorizing an additional 20,000 tons of vessel tonnage for the tuna fishing fleet. The Association at that time took the position that it would be unwise to expand the tuna fleet, but the Agency nevertheless proceeded to license the additional tonnage (primarily to permit fishing vessels withdrawn from other fisheries to enter the tuna fishery). Since that time the awareness of resource problems has begun to grow rapidly among tuna vessel owners. (Nihon Suisan Shimbun, August 17, 1964.)

* * * * *

MARKET VALUE OF TUNA FISHING LICENSES CONTINUES TO FALL:

The market value of tuna fishing licenses traded in Japan continues to decline, according to Japanese press reports. Tuna fishing licenses, which were traded at a premium of 420,000-460,000 yen (US$1,167-1,278) a vessel ton in the summer of 1963, declined in value to 350,000-360,000 yen (US$972-1,000) a ton in June 1964, and subsequently continued to drop, due to depressed business conditions. Quotations in late August were given as 170,000-200,000 yen (US$472-556), and even at $472, buyers were making payments in promissory notes payable in 120 days. The opinion among Japanese observers is that the market value may even decline to around 110,000 yen (US$306) within 1964. (Suisancho Nippo, August 29, 1964, and other sources.)

* * * * *

Japan (Contd.):

DRIFTWOOD RELEASED BY TUNA VESSELS RECOVERED:

The Tokai University Fisheries Research Laboratory in Shizuoka, Japan, has recovered 6 of about 200 planks and logs released by Japanese fishing vessels in June 1964 off southeast Formosa in an experiment to study the association of tuna with driftwood. The timbers were transported northward by the Kuroshio Current and were recovered on the beaches of Okinawa, Kagoshima (southern Kyushu), and Chiba Peninsula (south of Tokyo).

Examination showed traces of a considerable number of organisms having become attached to the driftwood, revealing the fact that organisms attach themselves to floating objects at sea within a short period of time. However, since all 6 wooden pieces had drifted ashore by the time they were found, the extent of pursuit of those objects by tuna, if any, could not be determined. (Suisan Keizai Shimbun, August 14, 1964.)

* * * * *

MOTHERSHIP FIRMS TO CONSIGN SALES OF PACK OF ALASKA PINK SALMON TO LAND-BASED PACKERS ASSOCIATION:

The four salmon mothership firms, which had purchased fresh pink salmon from Alaska fishermen, had refused to sell any of the fish to the land-based Hokkaido Salmon Packers Association. But those firms have accepted the Fisheries Agency's proposal that they consign the sales of the canned salmon packed from Alaskan pinks to that Association. Under the Agency's proposal, the Association would handle the export sales of the canned pink salmon at an assessment of six yen per case (US$0.017) to the mothership firms. Normally, the Association assesses a fee of 10 yen per case ($0.028), but it is understood that the reduced assessment will be an exceptional case applicable only to this year's sale.

The Association has abandoned its attempt to buy any Alaska pink salmon from the mothership firms. (Suisan Tsushin, September 2, 1964.)

* * * * *

HALIBUT LANDINGS AND EXPORTS, 1958-63:

Japan's total halibut landings of 9,688 metric tons in 1963 were down 2 percent from the previous year and dropped 15 percent from the record 1961 halibut landings. During the 1963 North Pacific halibut fishing season, Japan took 3.7 million pounds from the Triangle Area of the eastern Bering Sea. The 1963 quota for that area was set at 11 million pounds with the United States, Canada, and Japan fishing in the area.

Japanese Landings and Exports of Halibut, 1958-1963

Country	1963		1962		1961		1960		1959		1958	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
Production	9,688	-	9,899	-	11,416	-	6,931	-	1,240	-	1,270	-
	Short Ton		Short Ton		Short Ton		Short Ton		Short Ton		Short Ton	
Exports:												
United States	785	511,305	2,160	1,713,000	990	568,000	411	260,200	225	99,000	18	10,000
United Kingdom	779	443,372	210	84,800	156	85,000	-	-	124	40,100	8	2,500
Australia	2	1,340	-	-	-	-	-	-	1	300	-	-
Canada	-	-	-	-	-	-	-	-	2	900	-	-
West Germany	154	93,669	-	-	-	-	-	-	-	-	-	-
Netherlands	6	3,505	-	-	-	-	-	-	-	-	-	-
Other Countries	1	440	-	-	-	-	4	2,000	-	-	-	-
Total	1,727	1,053,631	2,370	1,797,800	1,146	653,000	415	262,200	352	140,300	26	12,500

Japan exported about 16 percent of its 1963 halibut landings. Most of those exports, valued at US$1.1 million, were about equally divided between the United States and the United Kingdom, with a smaller quantity going to West Germany. (Fisheries Attache, United States Embassy, Tokyo, September 9, 1964.)

* * * * *

JAPANESE VIEWS ON NEW LAW PROHIBITING FISHING IN U. S. TERRITORIAL WATERS BY FOREIGN VESSELS:

On May 20, 1964, President Johnson signed into law S. 1988 (introduced in the Senate

Japan (Contd.):

by Senator Bartlett), an act to prohibit fishing in the territorial waters of the United States and in certain other areas by vessels other than vessels of the United States and by persons other than United States nationals or inhabitants--P. L. 88-308. In signing the bill the President said, "This law fills a long-standing need for legislation to prevent foreign fishing vessels, which in recent years have appeared off our coast in increasing numbers, from fishing in our territorial waters... ."

Japanese views on P. L. 88-308 were contained in an article written by Kunio Yonezawa, First Ocean Section of Japan's Fishery Agency, which was published this past June in the Japanese periodical Suisan Jiho. A translation of that article follows:

"The Bartlett bill 'to prohibit fishing in the territorial waters of the United States and in certain other areas by foreign vessels and by persons in charge of such vessels' was signed into law by the President on May 20. Moreover, the Convention on the Continental Shelf, which is closely related to the so-called Bartlett Law, came into effect on June 10 following ratification by the United Kingdom (on May 10).

"Japan, fearing that the implementation of the 'Bartlett Law' would adversely affect the Bristol Bay king crab fishery which Japan has been conducting since 1930, conferred on this matter with the U. S. State Department through Ambassador Takeuchi. As a result, confirmation was made in the President's statement that the new law will not establish any new rights for the United States, and that, in its enforcement, full consideration will be given to Japan's long-established king crab fishery. Japan was thereby assured that her existing king crab fishery would be maintained. Of course, Japan had repeatedly indicated to the United States that she (Japan) was neither a signatory nor a participant to the Continental Shelf Convention so that, from the standpoint of international law, she was not bound by the Convention provisions embodied in that law. However, examples such as the 200-mile territorial sea limits imposed by Latin American countries, the Rhee Line, and the 1962 Shelikof Strait incident (involving seizure by the Alaskan Government of Japanese vessels fishing for herring on the high seas of that Strait and indictment of responsible persons) show that unilateral acts not sanctioned under international laws can actually eliminate foreign vessel operations through application of force. This is why Japan is so gravely concerned about the Bartlett Law and the Convention on the Continental Shelf.

"The Convention on the Continental Shelf is one of the Four Conventions on the Law of the Sea, and was drafted at the First Law of the Sea Conference held in Geneva in 1958. It defines the jurisdictional rights of coastal states with respect to natural resources and living resources of the continental shelf, and among the four conventions, it was the second to come into effect, next to the Convention on the Law of the High Seas. Japan, as mentioned earlier, is not a signatory to that Convention.

"The principal signatories are the United Kingdom, the United States, the Soviet Union, Australia, and Denmark. Latin American countries, which also assert their sovereignty over superadjacent waters of the continental shelf, are not signatories, since the Convention does not recognize jurisdiction of the coastal state over superadjacent waters. The United States, by means of the Truman Proclamation of 1945 and the Outer Continental Shelf Lands Act of 1953, has been asserting her rights over the continental shelf natural resources.

"The 'Bartlett Law' is intended to halt Cuban and other foreign vessel operations within U. S. territorial waters, as well as to check the expansion of Japanese and Soviet king crab operations. The bill was submitted to the United States Congress on August 6, 1963, under the joint signatures of such influential senators as Bartlett (Alaska), Jackson (Washington), Magnuson (Washington), and Kennedy (Massachusetts). It was designed to prohibit fishing by foreign vessels in the territorial waters of the United States or within any waters in which the United States has the same rights with respect to fisheries as it has in its territorial waters, and prohibits the taking of any continental shelf fishery resources which appertains to the United States. It further provides for penalties of up to $10,000, imprisonment of up to one year, or both, and seizure of fishing gear.

"The Act defines the continental shelf and the shelf fishery resource in the same manner as set forth in the Continental Shelf Convention. The continental shelf is defined as 'the seabed and subsoil of the submarine areas to a depth of 200 meters or, beyond that limit, to where the depth of the superadjacent waters admits of the exploitation of the natural resource of the said areas,' and the continental shelf fishery resources are defined as 'living organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed.' Concerning the listing of species belonging to the continental shelf fishery resources, the Secretary of the Interior, in consultation with the Secretary of State, will publish in the Federal Register a list of species to which this law applies.

"The discussion on the continental shelf resources evoked heated debates at the first Law of the Sea Conference held in 1958. The original draft contained the provision 'swimming fish and shellfish are not included,' and thus left little room for argument. In the deliberations on the final draft, however, a proposal was made to delete that provision. The motion was voted down by the Fourth Committee but, following deliberations, it was approved at the plenary meeting, thus keeping alive, among the nations, a needless source of argument over the application of the Convention, as was feared by the British delegate.

"The exclusion of the provision, 'swimming fish and shellfish are not included,' led to the development of two views on shellfish. (Incidentally, the United States, which opposed the deletion of that provision when the final draft was put to a vote by the Fourth Committee, voted in favor of deletion at the plenary session.) One view, shared by the United States and the Soviet Union, is that shellfish naturally are to be included in the definition of shelf resource. The other view (supported by the majority of nations at the Law of the Sea Conference) is that the continental shelf resource should be confined to those organisms in very close contact with the seabed, which naturally would not include shellfish and other swimming creatures. As was pointed out by the Australian delegate, who offered the definition of the

Japan (Contd.);

continental shelf resource, and by Garcia Amador, chairman of the deliberation committee, the provision was deleted for no other reason than it was 'repetitious of the text and therefore considered unnecesary.'

"The definition of the continental shelf and living resources of the shelf was jointly proposed by Australia, Ceylon, Malaya, Norway, and the United Kingdom (and later supported by the United States and the Soviet Union). However, at that time Ceylon stated that the 'living resources dwelling on the seabed can be classified into three categories: (1) those which are absolutely immobile on the seabed; (2) those which do not move more than 2-3 feet; and (3) those which move over a considerable distance (fish and shellfish), and the limit of inclusion of shelf resources is somewhere between categories 2 and 3.' Thus, the provision was deleted at the plenary meeting.

"Judging from the opinions of the various nations, as described above, as well as from the circumstances surrounding the deletion of the provision, i.e., 'swimming fish and shellfish are not included,' and moreover, considering the fact that the majority of the nations, which had agreed to retain the provision at the drafting committee meeting, had voted for its deletion at the plenary session, it seems reasonable to assume that the purport of the original draft remained unchanged. This has been pointed out by McDougal and Burke (1962), distinguished U.S. experts on international law, in their book entitled, 'The Public Order of the Oceans.' In it, they state that 'the thinking at the Law of the Sea Conference was that the living organisms that cannot move without constant contact with the seabed include only those organisms which cannot move more than a few inches to a few feet from their stationary positions on the seabed.' Thus, in view of the substance of the definition and the circumstances surrounding the deletion of the provision, the view that shellfish are not included in the shelf resource was shared by the majority of the countries (including Japan).

"In spite of this preponderance of opinion, the United States Government, in implementing the 'Bartlett Law,' plans to designate king crab as a species of the continental shelf resource under Article 5-a of that law. This perhaps is natural when viewed from the standpoint that the aim of the law was to have the United States retain exclusive rights to the king crab resource in the Gulf of Alaska. At the Senate public hearings on the Bartlett bill, officials of the U. S. State and Interior Departments testified, on the basis of the interpretation provided by experts of the Smithsonian Institute, that the king crab, which do not have swimming legs, belong to the shelf resource, whereas the blue crab and shrimp (including lobsters) do not fall within that category. However, even some Americans are concerned over this interpretation, which they feel will not necessarily bring about only beneficial results to their country. For example, the Astorian, a daily published in Oregon, stated as follows in its May 22 editorial: 'The paramount question is whether the United States will gain much or lose much from implementing this Act. In effect, this Act will be lending support to those countries which are seeking to extend their fishing rights to the superadjacent waters of the continental shelf.'

"Ghana was recently reported as having extended her territorial waters to a distance of 130 miles offshore. The shrimp problems in the Gulf of Mexico and the extension of territorial sea limits by Latin American countries are unlikely to strengthen the U. S. position as a result of her recent legislation, although they could weaken her position.

"The shrimp fishery in the Gulf of Mexico is one of the most important fisheries of the United States, yielding over \$30-40 million annually. About one-third of the Gulf shrimp is taken from waters of the continental shelf off Mexico. During deliberations on the Bartlett bill, Senator Bartlett is said to have explained to the head of the Gulf shrimp fishermen's union that the legislative measure would not affect the Mexican Government and thus successfully persuaded the union to withdraw its opposition to his bill.

"Brazil considers shrimp a shelf resource, and, as is still fresh in our memories, this provoked a crisis between that country and France a few years ago. On May 6 this year, Congressman O'Neill (Massachusetts) introduced a bill (H.R. 11158) which purported to prohibit import of fishery products from any country which does not permit American fishing vessels to operate in waters not recognized as territorial seas by the United States. Apparently the principal aim of this bill was to check extension of territorial water limits by Latin American countries, and it may have had some bearing on Senator Barlett's persuasion in connection with U.S. shrimp fishing on the continental shelf off Mexico.

"In view of the circumstances described above, there are unmistakable indications that the U. S. Government plans to include king crab in the category of shelf resource under the new Act. However, this poses a problem involving the relationship between the U. S. Act and the historical king crab fisheries conducted by foreign countries.

"The purport of the U. S. Act is not to unconditionally exclude fishing by foreign nations. Article 1 of that Act provides that a foreign vessel will be authorized to engage in fishing by means of a specific international agreement or by means of a permit granted by the Secretary of the Treasury after the Secretary of the Interior has certified that it would be in the national interest and upon concurrence of the affected State (possession). In the latter case, fishing may be authorized only when the concerned foreign nation extends the same privileges to U. S. fishing vessels. Therefore, in recognizing the historical fisheries of other countries under this Act, some kind of specific agreement with the affected nation becomes necessary. In view of Japan's basic position, it is obviously impossible for Japanese fishing vessels to operate by means of permits granted by the U. S. Secretary of the Treasury, and Japan and the United States are expected to hold a meeting in the near future to develop an agreement whereby Japan could continue her king crab fishery in Bristol Bay.

"In addition to Japan, the Soviet Union is also conducting king crab fishing on a fairly large scale in Bristol Bay. Unlike Japan, the Soviet Union, which is a signatory to the Continental Shelf Convention, is faced with a delicate situation. The Soviet crab fishery in Bristol Bay has only a five-year history dating back to 1959, but will the United States recognize it as an historical fishery? If not, will the Soviet Union quietly withdraw from that fishery? Also, if the Soviet Union is excluded from the Bristol Bay crab fishery, will she recognize Japan's historical fishing operations off her coast (Sea of Okhotsk)? These matters are all of grave concern to Japan. (Aside from this problem, the Soviet Union recognizes Norway's historical fisheries in Russian terri-

Japan (Contd.):

torial waters under an agreement concluded between those two countries.)

"As stated above, despite the implementation of the Continental Shelf Convention and enactment of the Bartlett bill, Japan has been able to continue her king crab fishery in Bristol Bay. However, one big question looms in our minds. The continental shelf off Alaska, even if limited to a depth of 200 meters, embraces an area totaling about 600,000 square miles, approximating the size of the entire State of Alaska. The United States not only asserts jurisdiction over the subsoil resource in that vast sea area but attempts to bring under her jurisdictional control other high sea resources that have been historically available for utilization by all the countries of the world, such as the king crab, which at the harvestable season travel (whether they swim is still questionable) hundreds of miles on and beyond the continental shelf. This attitude of the United States, stemming from her own one-sided interpretation, cannot but create a feeling of fundamental skepticism.

"After World War II, the unilateral acts imposed by many coastal countries have resulted in trampling upon the freedom of the high seas. The recent U. S. Act is a new challenge to this freedom and arouses concern not only because it tends to obscure the definition of living organisms belonging to the shelf resource but because it may result in lending support to those forces which seek to untilize it for their own advantage."

Note: See Commercial Fisheries Review, August 1964 p. 73; July 1964 p. 89.

* * * * *

KING CRAB OPERATIONS IN BRISTOL BAY:

The two Japanese king crab factoryships operating in Bristol Bay were packing an average of 500-600 cases a day. Production as of September 3, 1964, was 114,000 cases (target 120,000 cases) for the Tokei Maru (5,385 gross tons) fleet and 100,000 cases (target 115,000 cases) for the Dainichi Maru (5,859 gross tons) fleet. Both fleets were expected to attain their targets around September 15. (Suisan Tsushin, September 5, 1964.)

A large catch of crabs on the deck of a Japanese king crab factoryship.

* * * * *

BERING SEA MOTHERSHIP-TYPE BOTTOMFISH OPERATIONS:

Bottomfish catches by Japanese mothership fleets operating in the Bering Sea were exceeding those of 1963 as of August 1964. As of August 31, the combined fleet catch was about 340,000 metric tons, compared with about 240,000 metric tons for the same period in 1963. The herring catch of 42,000 tons this year was ahead of last year by about 10,000 tons. Fishing for that species had been terminated since production had already exceeded the target by 5,000 tons. Other Bering Sea catches as of August 31 were (1963 in parentheses): Alaskan pollack 161,000 tons (85,000 tons); rockfish 32,000 tons (9,000 tons); cod 18,000 tons (13,000 tons); flatfish 60,000 tons (50,000 tons); sablefish 5,500 tons (18,000 tons); halibut 2,000 tons (9,000 tons); shrimp 19,000 tons (25,000 tons).

The 1964 Bering Sea bottomfish operations were scheduled to be concluded in early October. (Suisan Tsushin, September 3, 1964.)

* * * * *

FREEZERSHIP RETURNS WITH ATLANTIC TRAWL-CAUGHT FISH:

The Japanese freezership Banshu Maru No. 12 (1,800 gross tons) returned to Shimonoseki, Japan, on September 5, 1964, with 1,250 metric tons of "kishima" sea bream taken off Southwest Africa. The freezership was assigned to the Japanese owners' trawling base at Cape Town, South Africa, in April this year. This was her second trip back to Japan with Atlantic trawl-caught fish. (Minato Shimbun, September 6, 1964.)

* * * * *

ATLANTIC TRAWL FISHERY:

The Atlantic trawl fishery holds the spotlight in Japan as the most promising enterprise among all Japanese distant-water fisheries. The fishery first developed in 1959 with two exploratory vessels to open up a new fishing ground for Japanese trawl operators seeking to transfer from the overcrowded East China Sea fishery. Subsequently it made a rapid expansion, and in 1963 the fleet had grown to 34 vessels with a total annual production of 92,082 metric tons of bottomfish.

The rapid expansion of the Japanese Atlantic trawl fishery is attributed to the abundance of high-value fish, such as sea bream, squid, and octopus, off the coast of West Africa, as well as to the growing market demand for those fish. Those

Japan (Contd.):

Expansion of Japanese Trawl Fishery, 1959-1963		
Year	Size of fleet	Catch
	No. Vessels	Metric Tons
1963	34	92,082
1962	26	49,133
1961	15	27,952
1960	8	6,380
1959	2	802

circumstances led the Japanese Fisheries Agency in July 1963 to license the operation of an additional 13 vessels (6 over 1,000 gross tons, 1 under 1,000 but over 300 gross tons, and 6 under 300 gross tons) for the Atlantic trawl fishery. Those 13 newly licensed vessels are expected to be placed in operation within this year, along with 5 other new vessels earlier authorized by the Agency for construction. Therefore, by 1965, the Japanese Atlantic trawl fleet is expected to increase to over 50 vessels.

The principal areas of operation of the Japanese Atlantic trawl fleet are the waters off northwest Africa between 10-30° N. latitudes and the area off southwest Africa south of 30° S. latitude. In the northwest African fishing grounds, the principal species of fish taken are "sakura" sea bream, "monko" squid, and octopus. In the southwest African coast, "kishima" sea bream and "merluza" (hake) are primarily taken. Japanese vessels generally trawl at depths ranging from 60-200 meters (196.8-656 feet).

The trawl-caught fish are quick-frozen in the round or dressed. Sea bream, squid, and octopus, which command a high price in the Japanese market, are mostly transported back to Japan, while "merluza" and mackerel are practically all exported to European and African countries. Japanese exports of Atlantic-caught bottomfish to those countries are yearly increasing--sales in 1963 reached 38,000 metric tons.

Most of the Japanese trawlers operating in the Atlantic Ocean work out of either Las Palmas, Canary Islands, or Cape Town, South Africa. From those bases they go out on 30- to 40-day fishing trips and normally remain away from Japan for about 1-1/2-2 years. Crew members are rotated periodically, and some companies have instituted a program of flying replacements from Japan on chartered planes. (Nihon Suisan Shimbun, August 28, 1964.)

* * * * *

EXPLORATORY TRAWLING IN NORTHWEST ATLANTIC TO BE CONTINUED:

A large Japanese fishing company was granted a one-year extension of a fishing permit by the Japanese Fisheries Agency to continue experimental trawl operations in the Northwest Atlantic Ocean. The original one-year permit expired August 31, 1964. In the second year, the firm plans to change its method of operations and for that reason is considering replacing the trawler Tenyo Maru No. 3 (3,500 gross tons) now trawling in the Northwest Atlantic waters with a new 2,800-ton stern trawler presently under construction.

The Tenyo Maru No. 3, which is fishing together with two 300-ton trawlers in the Northwest Atlantic, was last reported as taking mostly rockfish, and her daily catch was said to be averaging 40-50 tons, falling below the production target of 60 tons per day. (Suisancho Nippo, September 1; Shin Suisan Shimbun, August 24, 1964.)

* * * * *

JAPAN TO JOIN NORTHWEST ATLANTIC FISHERIES CONVENTION:

The Japanese Fisheries Agency, in cooperation with the Foreign Ministry, is studying the the possibility of becoming a member of the various international fishery treaties which are considered likely to affect Japan's fishing industry. In particular, the Japanese Government is proceeding with definite plans to join the International Convention for the Northwest Atlantic Fisheries, which regulates fishing in the northwest Atlantic Ocean. Japan, which is conducting experimental trawl fishing in those waters, has been asked by the signatories to become a party to that Convention. (Suisan Keizai Shimbun, August 28, 1964.)

* * * * *

LONGER TRIP DOUBLES BOTTOMFISH CATCH FOR TRAWLERS IN NEW ZEALAND WATERS:

A large Japanese fishing company's trawlers (Taiyo Maru Nos. 56 & 57, each of 744 gross tons) landed a total of 3,000 metric tons of bottomfish in almost 9 months of trawling in New Zealand waters. This represents close to twice the catch that had been taken during comparable periods in previous years when that company's trawlers were shifted every 3 months. One-third of the catch consisted of sea bream and the rest was jack mackerel and Spanish mackerel. Most of the catches landed by the two trawlers were transshipped to Japan from Noumea, New Caledonia, by carrier vessels. In view of this success, the firm plans to extend the trip length for its future trawl operations in New Zealand waters. (Nihon Suisan Shimbun, August 10, 1964.)

* * * * *

LICENSING OF BOTTOMFISH OPERATIONS OFF NEW ZEALAND:

Japanese fishing vessel owners in Nagasaki, Japan, who are fishing bottomfish by longline in New Zealand waters, are planning on petitioning the Fisheries Agency to license that fishery in order to restrict the expanding Japanese vessel operations in that area. They fear that the present unrestricted fishing will

Japan (Contd.):

eventually deplete the local sea bream resources.

Long-line fishing in New Zealand waters attracted the attention of Japanese operators for the first time in 1963 when Chiyoda Maru No. 6 (472 gross tons) conducted experimental long-line fishing for bottomfish in that area in August 1963 and returned with 187 metric tons of sea bream in late November that year. Subsequently, Japanese long-liners began to converge on the new fishing ground until there were some 18 vessels working that area. (Minato Shimbun, August 14, 1964.)

* * * * *

STATUS OF VOLUNTARY FISHERY EXPORT CONTROLS, FY 1964:

Japanese "voluntary" fishery export controls in fiscal year 1964 (April 1964-March 1965) include quantitative and price controls. The United States is affected by the Japanese voluntary quantitative controls applied to shipments of frozen swordfish, frozen tuna, and frozen tuna loins and discs to the Western Hemisphere (see table). The United States is also affected by Japanese price controls on pearl shipments.

Japanese Voluntary Quantitative Export Quotas Affecting Shipments of Fishery Products to the United States, FY 1964

Product	Destination	Export Quota, Fiscal Year 1964 1/	Actual Exports to United States, Calendar Year 1963 2/	
		Quantity	Quantity	Value 3/
		(Metric Tons)	(Metric Tons)	US$1,000
Swordfish, frozen	North and South American countries	5,500	6,363	4,218
Tuna, frozen	United States and Canada	4/111,800	52,021	17,598
Tuna loins and discs, frozen	United States and Canada	7,000		

1/April 1964-March 1965.
2/Exports to the United States on Japanese customs clearance basis during January-December 1963.
3/F.o.b. Japan.
4/Includes 110,000-ton quota for Japanese Frozen Food Exporters Association and 1,800-ton quota good for those who are not members of the Association.
Note: Export regulations have been listed as "voluntary" controls only when the export situation indicates they were imposed primarily for the purpose of maintaining orderly marketing abroad. The "voluntary" controls do not include those imposed as a result of (1) bilateral or multilateral agreements with other countries; (2) United States tariff quotas such as the quota on canned tuna in brine; and (3) Japanese regulations designed primarily to avoid or halt "excessive competition" among Japanese manufacturers and exporters.

Japan also applies voluntary fishery export controls which do not affect United States trade. Japanese exports of canned tuna in oil are subject to price controls, but that commodity is mostly not exported to the United States. Japanese shipments of canned sardines and mackerel to Burma are subject to a fiscal year 1964 quota of 200,000 cases (48 15-oz. cans), and Japanese shipments of frozen tuna to Europe are subject to a FY 1964 quota of 70,000 tons. (United States Embassy, Tokyo, August 11, 1964.)

Note: See Commercial Fisheries Review, May 1962 p. 63.

* * * * *

HOKKAIDO SAURY CANNERS SIGN ADVANCE PURCHASE AGREEMENT WITH FISHERMEN'S ASSOCIATION:

The 26 Hokkaido export saury canners on August 20, 1964, signed an advance saury purchase agreement with the Hokkaido Fishery Products Association, representing Hokkaido saury fishermen. This agreement, the first of its kind to be concluded in Japan, provides that: (1) the period of contract shall begin August 12 and end October 10 each year (although for 1964 the beginning date shall be September 3); (2) the total quantity to be contracted shall be 13,000 metric tons, with packers agreeing to purchase 160-200 tons daily at unloading ports; (3) canners shall pay a standard purchase price of 14.5 yen a kilogram (US$37 a short ton).

A similar agreement was under negotiation between 14 saury canners and 20 vessel owners in Choshi, Chiba Prefecture (south of Tokyo). Canners had offered to pay 18 yen a kilogram (US$45 a short ton), but producers were seeking an arrangement whereby price adjustments could be made in case the market advanced. (Minato Shimbun, August 22, 1964.)

* * * * *

FISH MEAL ASSOCIATION ORGANIZED:

The Japan Fish Meal Producers Association, a national organization of coastal fish meal producers, was formally organized at a meeting held on August 12, 1964. Business

Japan (Contd.):

activities to be conducted by the Association during the first year are: production survey, marketing research, and contact with the concerned agencies of the national Government. (Suisan Tsushin, August 13, 1964.)

* * * * *

FISHERIES AGENCY APPROVES JAPANESE-CHILEAN WHALE MEAT SALES AGREEMENT:

The Japanese Fisheries Agency on August 14, 1964, approved the whale meat sales plan arranged between a Japanese whaling firm and a Chilean firm. Under the sales agreement, the Japanese firm will sell its whale catches taken in the waters off Chile to the Chilean firm and will repurchase whale meat from it for export to Japan. The Japanese firm plans to repurchase 11,000 metric tons of whale meat from the Chilean firm at a price of about 20,000 yen (US$55) a metric ton, which it will freeze aboard the chartered Japanese freezership Seifu Maru (7,000 gross tons), for shipment back to Japan.

The Japanese firm plans to operate 5 catcher vessels for this whaling operation, for which it has established a catch target of 485 whalebone whales (converted to blue-whale units) and 640 sperm whales. This year is the Japanese firm's second year of whaling operations based in Chile. (Shin Suisan Shimbun, August 24, 1964.)

* * * * *

FISHING VESSEL CONSTRUCTION:

Data on Japanese fishing vessel construction compiled by the Fisheries Agency show that during the first quarter of fiscal year 1964 (April 1964-March 1965) the Agency approved the construction of 100 fishing vessels--68 steel vessels (totaling 27,257 gross tons) and 32 wooden vessels (totaling 1,091 gross tons). This was a sharp decrease from the same period in the past three years when 333 vessels were approved for construction in fiscal year 1963, 200 in fiscal year 1962, and 312 in fiscal year 1961.

While comparison with 1963 may not be appropriate, since that year saw a sharp increase in the construction of 39-ton class vessels prior to the Government's adoption of a new policy to license vessels in the 39-ton category, the fiscal year 1964 figure is a substantial decrease of over 50 percent even when compared with fiscal years 1961 and 1962. The Agency attributes that decline to poor business conditions prevailing in all the fisheries, and estimates that this slowdown in vessel construction will continue for the rest of the fiscal year.

A Japanese firm took delivery of its new stern trawler Ojika Maru (3,000 gross tons) built at a total cost of about 750 million yen (US$2.1 million). The Ojika Maru is equipped with filleting and fish-meal processing machines, and is one of the most modern fishing vessels in Japan. She was scheduled to depart Japan for the fishing grounds off West Africa on September 3, 1964. Specifications and complement of the Ojika Maru are: gross tonnage--3,000 tons; total length--310.8 feet; beam--48.9 feet; draft--23.5 feet; maximum speed--15.6 knots; freezing capacity--51.77 tons a day; cruising range--24,000 nautical miles; complement--80.

A new Japanese stern trawler Koyo Maru (2,521 gross tons) was delivered to her owners on September 1, 1964. After a five-day shakedown cruise in the East China Sea, the vessel was to depart Japan on September 10, 1964, for the trawl fishing grounds off West Africa, where she is scheduled to operate for a period of one year and three months.

Another Japanese fishery firm is building three 3,500-ton-class stern trawlers in Okayama Prefecture. The first trawler Aso Maru was scheduled for completion at the end of September and was assigned to the Bering Sea. The second vessel Kirishima Maru was scheduled to be launched in November and upon completion would be despatched to the Atlantic trawling grounds. The third vessel Takachiho Maru was tentatively scheduled to be assigned to the Gulf of Alaska upon completion. (Suisan Keizai Shimbun, September 9, 1964; Minato Shimbun, September 2 and 3, 1964; Shin Suisan Shimbun Sokuho, August 20, 1964.)

* * * * *

EIGHT FACTORYSHIPS TO BE BUILT FOR U.S.S.R.:

A large Japanese shipbuilding company has received orders from the Soviet State Fisheries Commission for the construction of eight 1,800-ton-class bottomfish factoryships. The firm's Yokohama shipyard was scheduled to commence construction of the vessels in Sep-

Japan (Contd.):

tember 1964 with plans to complete the first vessel in April 1965 and the rest by November 1966.

Construction of those vessels is expected to further intensify competition between the Soviet Union and Japan in the bottomfish fishery, but the view of the Japanese Fisheries Agency is that Japan will have to extend her cooperation to foreign fisheries if she is not to become isolated from other countries. (Suisan Keizai Shimbun, September 4, 1964.)

* * * * *

FISHERIES AGENCY TO BUILD LARGE RESEARCH VESSEL:

The Japanese Fisheries Agency's budget submission for fiscal year 1965 (April 1965-March 1966) contains a program to build a 2,600-gross-ton fishery research vessel. The vessel will be used to conduct investigative work on bottomfish resources in the northern waters (Okhotsk Sea, Bering Sea, and North Pacific Ocean), offshore waters of New Zealand and Africa, and in the northwest Atlantic Ocean.

At present, the Agency operates 11 research vessels, but the Shoyo Maru (641 gross tons), now being used for tuna investigations, is the only one that can be sent on distant-water cruises. All other distant-water resource and oceanographic investigations by the Agency are being conducted by chartering commercial research vessels or by placing Government researchers aboard commercial fishing vessels. (Suisan Keizai Shimbun, August 12, 1964.)

Republic of Korea

FREEZER VESSEL LAUNCHED AT NETHERLANDS SHIPYARD:

A new freezer vessel of 7,000 deadweight tons built by a Rotterdam, Netherlands, shipbuilding firm for a fishing firm in Pyongyang, North Korea, was scheduled for launching at its Alblasserdam shipyard in August 1964. The vessel has a storage capacity of 7,500 cubic meters (about 265,000 cubic feet) for frozen fish, that can be held up to -13° F. (United States Embassy, The Hague, August 29, 1964.)

Mexico

OPENING OF SHRIMP FISHING SEASON:

Mexico's West Coast commercial shrimp fishing season inside the coastal lagoons opened September 1, 1964, and some shipments have already been made.

The West Coast ocean shrimp fishing season was to have started on September 15 but the fishing cooperatives petitioned for a delay to October 1. In a compromise with the private vessel owners who reportedly wanted to open the season on schedule, the Mexican Government set the opening for September 22.

Meanwhile, on Mexico's East Coast on the Gulf, all parties concerned have reached agreement on conditions for the season and fishing was reported to be proceeding. (Fisheries Attache, U. S. Embassy, Mexico, September 19, 1964.)

* * * * *

NEW TARIFF RATES FOR FOUR CATEGORIES OF FISHERY PRODUCTS:

New tariffs on Mexico's imports of fishery products and byproducts were published in the Official Daily of September 1, 1964. The tariff on only four classifications was changed, including a lower duty on cod oil. The new tariff on cod oil imports is 0.25 pesos per gross kilogram (0.9 U. S. cents a pound) plus 10 percent. The old rate was 0.30 pesos per gross kilogram (1.1 cents a pound) plus 30 percent. The percentage figure is the additional rate based on invoice price or official price whichever is higher.

United States exports of cod oil to Mexico in 1963 were valued at $34,300, and in 1962 they were valued at $43,000.

Tariff changes on the other fishery classifications were (figures in parentheses are the old rates):

Live fish, except those for repopulation programs; each fish: 9.00 pesos (72 cents) plus 100 percent (1.00 peso or 8 cents plus 50 percent.)

Shellfish, fresh or frozen, not otherwise specified, per gross kilogram: 2.00 pesos (7.3 cents a pound) plus 60 percent (1.00 peso or 3.6 cents a pound plus 50 percent).

Shellfish, canned, not otherwise specified, per legal kilogram: 3.50 pesos (12.7 cents a

Mexico (Contd.):

pound) plus 100 percent (2.00 pesos or 7.3 cents a pound plus 100 percent). (Fisheries Attache, United States Embassy, Mexico, D. F., September 9, 1964.)

* * * * *

FOREIGN TRADE IN FISHERY PRODUCTS, 1963:

Exports: Shipments to the United States accounted for 99 percent of the value of total Mexican fishery exports during 1961-1963. The trade is dominated by fresh and frozen shrimp exports, which accounted for 88.6 percent of the value of total Mexican fishery exports in 1963. Mexican fishery exports, far in excess of fishery imports, are a major source of foreign exchange in Mexico and directly affect the income of thousands of Mexican fishermen.

The total value of Mexican fishery exports rose to a record $64.7 million in 1963. The increase was due mainly to higher average prices for the leading products, because the quantities shipped remained about the same as in 1962. Unit prices were also boosted in 1963 by the tendency to include a larger proportion of processed fishery products in the exports (such as peeled and deveined shrimp, and individually frozen shrimp).

A limited amount of canned and dried shrimp is also exported. Both were formerly of considerable importance, but have now dwindled away to practically nothing. Canada was the principal buyer of Mexican canned shrimp.

Second in importance among Mexican fishery export items is canned abalone, which accounted for 5 percent of the value of the fishery exports in 1963. In the last few years, exports of frozen sliced abalone meat have also achieved considerable importance. Formerly, dried abalone was exported in quantity, but the demand for frozen abalone in the United States has resulted in a diversion of abalone meat to that market.

Table 2 - Value of Mexican Exports and Imports of Fishery Products, 1961-1963			
Item	1963	1962	1961
	. . . . . .(US$1,000).		
Exports:			
Fresh or frozen	60,317.0	53,285.0	43,866.6
Canned	3,750.1	2,623.3	2,464.1
Salted, dried, etc.	39.6	37.0	40.9
Edible products, not specified	3.2	50.0	57.4
Industrial	598.6	518.7	482.6
Total fishery exports	64,708.5	56,514.0	46,911.6
Imports:			
Industrial	4,130.6	2,920.6	1,854.7
Salted, dried, etc.	562.0	491.3	365.4
Canned	158.3	279.2	385.0
Fresh or frozen	229.5	166.3	209.4
Total fishery imports	5,080.4	3,857.4	2,814.5

Note: Values converted at rate of ₱12.50 equal US$1.00.

All of the abalone for export is harvested in Baja California, mostly in the northern State.

Third in importance is spiny lobster with an annual value in 1963 of $878,700. Practically all of the export lobster is also produced in Baja California.

Mexico has developed a good market in the United States for frozen fish fillets with annual shipments valued at $0.5 million. Furthermore, much of the exports listed under "Other products" in table 1 are also fresh or frozen fish.

After the United States stopped buying frog legs from Cuba, exports of frog legs from Mexico increased considerably and there is interest in expanding Mexican frog production further.

Imports: Because the Mexican fishing industry can supply most of the needs of the Mexican market, fishery imports continue at a rather low level. Efforts of the Mexican Govern-

Table 1 - Mexican Exports of Principal Fishery Products, 1962-1963						
Product	1963			1962		
	Qty.	Value		Qty.	Value	
	Metric Tons	US$ 1,000	% of Total Val.	Metric Tons	US$ 1,000	% of Total Val.
Shrimp, fresh & frozen	34,639.9	57,360.4	88.6	34,664.8	49,836.6	88.2
Abalone, canned	3,818.0	3,212.2	5.0	3,083.7	2,311.6	4.1
Spiny lobster, fresh & frozen	795.8	878.7	1.4	744.4	884.7	1.6
Fish fillets, fresh & frozen	1,441.9	520.8	0.8	1,383.3	538.7	1.0
Tuna, fresh & frozen	2,010.5	407.5	0.6	1,986.3	454.3	0.8
Abalone fillets, fresh & frozen	167.1	348.1	0.5	177.9	342.4	0.6
Marine algae	18,591.8	242.9	0.4	21,175.7	292.9	0.5
Frogs, fresh & frozen	314.0	236.0	0.4	293.9	232.1	0.4
Totoaba, fresh & frozen	366.8	86.8	0.1	745.7	452.1	0.8
Shrimp, canned	0.6	0.3	1/	240.7	298.0	0.5
Other products	3,952.6	1,414.8	2.2	3,076.7	870.6	1.5
Total fishery exports	66,099.0	64,708.5	100.0	67,573.1	56,514.0	100.0

Note: Values converted at rate ₱12.50 equal US$1.00.

Mexico (Contd.):

ment to further develop and diversify the Mexican fisheries may result in even smaller imports in the future.

By far the most important single fishery product imported by Mexico is Peruvian fish meal which is used as feed by the rapidly developing Mexican poultry industry. The only other fishery import of real importance is dried salted cod (mostly from Norway). Because of its low cost and its keeping qualities in extreme climates, salt cod or "bacalao" has long been a favorite throughout Latin America.

Marine oils and agar-agar are also imported products of some value. Most of the rest are luxury items which can not be produced in Mexico because the resources do not exist or the cost of production would be excessive. Those include such things as frozen eels, canned anchovy and anchovy paste, canned smoked oysters, frozen, canned and smoked salmon, canned crab, and caviar.

The United States is Mexico's third most important supplier of fishery products (after Peru and Norway). But United States fishery exports to Mexico were valued at only $320,700 in 1963. (United States Embassy, Mexico. D. F., August 27, 1964.)

* * * * *

FISHERIES TRENDS, 1963:

Shrimp: By far the dominant factor in the Mexican fishing industry is shrimp. Those landings in Mexico during 1963 were about the same as in the previous year, and down only 1.4 percent from the record landings in 1961. Shrimp landings in 1963 were reported from all coastal states and territories except Michoacan on the Pacific Coast and Quintana Roo on the Caribbean. Despite widespread operations on both coasts, some excess capacity is now reported in the Mexican shrimp industry.

The United States is the main market for Mexican shrimp. In the latter half of 1963, United States shrimp prices declined from the high levels established earlier in the year, and by early 1964 the profit margin in the Mexican shrimp industry had narrowed. Future market upsets could affect Mexican shrimp production adversely. For that reason, the industry is attempting to develop shrimp markets outside the United States, and real efforts are being made to diversify the entire fishing industry to avoid the difficulties of a monolithic fishery.

While Mexican shrimp landings at Gulf of Mexico ports have remained fairly steady for many years, catches on the Pacific Coast more than doubled between 1957 and 1961. Since 1961, the Pacific catch has shown a small decline (to 54,532 metric tons in 1963), while Gulf Coast landings increased (to 18,393 tons in 1963).

Table 1 - Mexican Shrimp Landings 1/ by State, 1957-1963

States by Coastal Grouping	1963	1962	1961	1960	1959	1958	1957
	. . . .	. . . . .	(Metric Tons)	. . . . .			
West Coast:							
Sinaloa	28,092	29,293	30,863	25,306	18,613	15,007	12,102
Sonora	16,315	17,136	16,717	14,119	13,208	10,391	9,032
Oaxaca	5,972	5,512	5,799	7,440	8,455	5,931	3,350
Chiapas	2,092	1,887	1,648	1,949	1,568	1,401	1,592
Nayarit	918	652	1,031	584	1,217	1,803	1,133
Baja California, Norte	913	952	1,154	1,004	851	1,309	463
Colima	87	37	116	72	12	96	16
Baja California, Sur	72	35	126	32	193	119	47
Guerrero	56	127	116	63	24	139	132
Jalisco	15	3	3	46	92	1	30
Total West Coast	54,532	55,634	57,573	50,615	44,233	36,197	27,897
East Coast:							
Campeche	15,392	12,362	13,653	14,737	13,702	13,970	14,363
Veracruz	1,663	2,749	1,696	1,656	1,656	1,121	1,736
Tamaulipas	1,034	877	818	651	1,111	820	1,039
Tabasco	300	231	253	328	334	162	166
Yucatan	4	-	-	-	-	-	-
Total East Coast	18,393	16,219	16,420	17,372	16,803	16,073	17,304
Total Mexican shrimp landings	2/72,924	2/71,852	2/73,995	67,987	61,036	52,270	45,201
Total landings divided on percentage basis:							
	. . . . .	. . . . .	(Percent)	. . . . .			
West Coast	74.8	77.4	77.8	74.4	72.5	69.3	61.7
East Coast	25.2	22.6	22.2	25.6	27.5	30.7	38.3

1/Heads-on weight.
2/Total does not exactly equal combined East and West Coast landings.

Sinaloa is now the leading Mexican shrimp State, accounting for almost 39 percent of the total catch in 1963. Sonora, also on the Pacific Coast, was in second place in 1963 with about 22 percent of the total.

Campeche on the Gulf of Mexico was for many years the leading Mexican shrimp-producing State until the upsurge of the Pacific Coast fishery. Campeche landings fluctuated from about 12,000 to 15,000 tons between 1957 and 1962 with a low in 1962. The catch improved to a high of 15,392 tons in 1963, or 21 percent of the national total. (The waters off Campeche produce far more than the Mexican landings indicate. United States shrimp vessels fish in the Gulf of Mexico outside Mexican territorial waters and land directly at Florida and Texas ports.)

Fourth in importance is Oaxaca on the Pacific Coast. Catches increased rapidly in 1958 when many vessels transferred to Salina Cruz from the Gulf of Mexico. Landings peaked at 8,500 tons in 1959 and have leveled off at about 6,000 since then. In 1963 Oaxaca accounted for 8 percent of the total Mexican shrimp catch.

Landings in other Mexican states accounted for the remaining 10 percent of Mexican shrimp landings. Veracruz, which supplies much of the fresh shrimp for the domestic Mexican

Fig. 1 - Mazatlan, Sinaloa, as seen by a shrimp fishing vessel returning to port.

Fig. 2 - Part of the 270 shrimp fishing vessels operating out of the port of Mazatlan.

Mexico (Contd.):

Fig. 3 Part of canoe fleet of about 100 that lands on beach at Mazatlan.

market, has had widely fluctuating catches ranging between 1,100 and 2,700 tons since 1957.

Shrimp landings were reported in 50 Mexican ports in 1963, but 5 ports accounted for over 72 percent of the total catch.

Mazatlan, Sinaloa, bases its claim to be the shrimp capital of the world on its 1963 landings of 19,328 tons which accounted for 26.5 percent of the Mexican shrimp catch. In order, the other leading ports in 1963 were: Guaymas, Sonora, 12,430 tons (17.0 percent); Ciudad Carmen, Campeche, 10,289 tons (14.1 percent); Salina Cruz, Oaxaca, 5,629 tons (7.7 percent); and Campeche, Campeche, 5,086 tons (7.0 percent). Puerto Penasco, Sonora, reported 2,734 tons, and 5 other ports took delivery of a little over 1,000 tons each.

Table 2 - Mexican Fishery Landings 1/of Edible Species, 1961-1963

Species	1963	1962	1961
	(Metric Tons)		
Shrimp	72,924	71,852	73,995
Oysters	19,770	18,320	19,186
Sardine	19,394	14,918	20,375
Abalone	8,281	7,231	6,443
Mackerel (Pacific & jack)	7,887	3,202	4,922
Jewfish, grouper, cabrilla	7,238	6,083	5,833
Shark	4,776	4,637	4,859
Tuna	4,038	3,812	3,207
Spanish mackerel (sierra)	3,867	4,025	3,898
Snapper	3,491	2,883	2,198
Mullet	3,472	3,189	3,144
Snook (robalo)	3,299	3,976	3,071
Clams (marine & fresh-water)	2,071	2,237	2,248
Mojarra (marine & fresh-water)	1,849	1,568	1,584
Corvina	1,637	1,560	1,242
Anchovy	1,637	1,066	244
Whitefish, fresh-water	1,505	1,275	980
Tarpon, milkfish	1,451	1,762	1,686
Spiny lobster	1,281	1,230	1,190
Totoaba	1,108	1,245	798
Yellowtail, jacks, pompano	1,095	1,291	1,210
Croakers	1,060	766	984
Marine turtles	948	1,451	1,330
Miscellaneous species	26,542	15,777	12,794
Tot. landings of edible species	200,621	175,356	177,421

1/Landings are shown on a live-weight basis. For certain species, live-weight landings were computed.

Fig. 4 - General view of fishing boats in harbor at Ensenada, Baja California.

Fig. 5 - Purse seiners unloading sardines and mackerel at Ensenada. Suction pumps are on floating barge between vessels. Belt conveyors carry fish to trucks.

Other Major Fisheries: Although the Mexican shrimp industry has apparently reached a plateau, other Mexican fisheries have considerable potential for expansion. In 1963, Mexican landings of edible fish other than shrimp were up 23.4 percent from the comparable landings in 1962. The increase was due mainly to a gain in landings of species in the "miscellaneous" classification (table 2).

In the Mexican fisheries, during the period 1961-1963, oysters (shell weight) and sardines alternated in second and third place (from a volume standpoint). Oysters, which are taken mainly for the Mexican domestic fresh market, showed relatively steady production during the 3 years at about 19,000 tons. The greater part of the oyster harvest comes from the Tampico area.

The sardine catch has fluctuated widely, depending on the availability of fish to the Ensenada fleet. The sardine vessels, equipped with brine refrigeration, fish several hundred miles south of their home port in order to maintain production when the fish fail to appear in local waters. Sardines are canned, mainly for domestic consumption, although some are exported. The same fleet, based at Ensenada, also takes Pacific mackerel and jack mackerel for canning. The reported mackerel catch increased sharply in 1963 to nearly 8,000 tons. Actually, sardines and both species of mackerel are often landed in mixed loads. Therefore, it may be more accurate to say that the combined sardine-mackerel fishery for the canneries yielded a catch of 27,281 tons in 1963 as compared with 18,120 tons in 1962 and 25,297 tons in 1961.

Industrial Fish: Landings of industrial fish and the output of industrial fishery products in Mexico is not of great significance.

Mexico (Contd.):

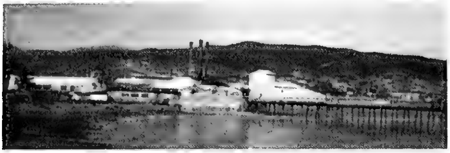


Fig. 6 - Largest fish cannery (sardines, mackerel, tuna) in Mexico at El Sauzal, Baja California Reduction and stickwater plants at left.

Fig. 7 - Butchering four large sharks on the beach at Teacapan, Sinaloa.

Omitting kelp (19,054 tons were harvested in 1963), Mexican output of industrial products averaged 7,774 tons annually in 1961-63. The most important item on a weight basis was fish meal. However, the annual fish meal production, which averages about 5,500 tons, is far from sufficient for the needs of the Mexican poultry industry, and fish meal has become Mexico's major fishery import. (United States Embassy, Mexico, D. F., August 27, 1964.)

* * * * *

JOINT JAPANESE-MEXICAN WHALING VENTURE IN MEXICO PROPOSED:

Negotiations were under way between a Japanese whaling firm and Mexican interests for the establishment of a joint Japanese-Mexican whaling venture in Ensenada, Baja California. The Japanese firm was expected to send a representative to Mexico to discuss the details of the arrangement and was also scheduled to conduct an exploratory survey off the Baja California peninsula in early September 1964 with two catcher boats (Kyo Maru Nos. 20 and 22). The catchers will conduct the survey for about one week after which they will proceed to the whaling base at South Georgia Island. If agreement can be reached between the two national interests, the Japanese firm plans to send a freezership and several catcher boats to Ensenada in the spring of 1965. (Suisan Keizai Shimbun, August 27, 1964.)

* * * * *

FOUR FISHERY TRAINING VESSELS ORDERED BY GOVERNMENT:

Four all-purpose 32-foot fishing vessels with fiberglass hulls were ordered in the summer of 1964 by the Mexican Government. The vessels will be used for training purposes by the Practical Fishing Schools at La Paz (Baja California Sur) and Manzanillo (Colima). Each of the vessels has accommodations for four men. One of the vessels may be loaned to a fishermen's cooperative.

The vessels have been ordered through a Mexican shipyard in Mazatlan. Fiberglass hulls for the vessels are being built under a subcontract by a United States firm in Kirkland, Wash. The first vessel will be completely outfitted and delivered ready to fish by the United States builder. The fiberglass hulls of the other three will be finished and outfitted at the Mazatlan yard.

Each of the new vessels will be capable of fishing gill nets, small purse seines, long lines and other gear, and will be able to carry up to five tons of iced fish. They will be equipped with all-purpose winches, hydraulic net drums, and power blocks. The vessels will be powered by 130-horsepower engines. (United States Embassy, Mexico, D. F., September 10, 1964.)

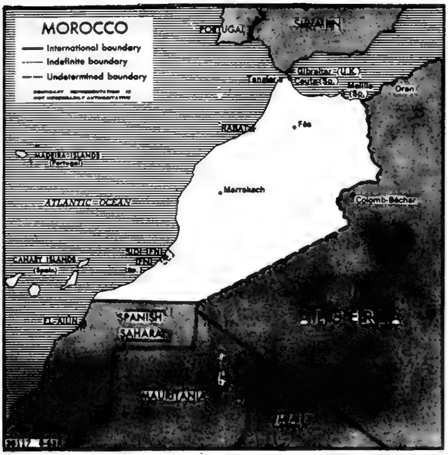
Morocco

JOINT MOROCCAN-FRENCH TUNA FISHING EXPLORATION PLANNED:

The Government of Morocco has been contemplating a one-year tuna fishing exploration program using an adequately equipped tuna fishing vessel of about 250 tons. The main objective is to determine in a more scientific manner the tuna resources available off the Moroccan coast before investing in expanded tuna canning facilities.

It was reported that Moroccan Government authorities were considering an offer by a French group to carry out the experimental project, and that a partial subsidy might be forthcoming from the French Government. Later developments brought about an agreement between the Moroccan Government and the French group for implementation of the program. The French vessel in question, which had been fishing in the waters south of Morocco, was said to be equipped to fish using both purse-seine and live-bait methods. The vessel was supposed to be available and ready to begin the experiment about September 1 this year, and a joint organization to handle the project has been set up.

Morrocco (Contd.):



A spokesman stated that the project was to be carried out as closely as possible in line with recommendations made by a United States tuna expert who conducted a tuna fishing survey in Morocco in July 1963. Tuna catches will most likely be sold in the ports of Safi and Agadir to local canneries. No price has been fixed for the tuna as yet, but it is believed that this might be in the negotiation stage with the French. It is presumed that some Moroccan crewmen will be taken aboard the French vessel.

The spokesman for the project stated he hoped the experiment would be carried out in the most effective way possible, and that the results would be made available to United States as well as European tuna canning groups and financial institutions. He expressed the hope that if the results of the survey are positive and confirm that there is a basis for a modern and expanded tuna canning industry in Morocco, that United States firms might be interested in taking part in the development of the plants and fishing program. (United States Embassy, Rabat, August 28, 1964.)

* * * * *

CANNED SARDINE LOANS RECEIVE RENEWED PARTIAL GUARANTEE FROM GOVERNMENT:

The partial government guarantee for bank loans on canned sardines in Morocco was renewed for the period April 1964-March 1965 by Moroccan Decree No. 311-64 of May 11, 1964, issued by the Minister of Economic Affairs, Finance, and Agriculture (published in the Bulletin Officiel No. 2697, July 8, 1964).

The guarantee was originally established by Dahir 1-56-329 of January 8, 1956. Under the conditions and ceilings specified by an annual implementing decree, that dahir authorizes the government to guarantee against depreciation of security or bankruptcy of debtor up to 20 percent of the total amount of credit advanced annually to dealers in canned sardines.

Under the implementing decree for 1964/65, bank loans for canned sardines are fixed at an annual interest rate of 4.5 percent and must not exceed 32 dirhams (US$6.40) per case for ordinary sardines and 50 dirhams ($10.00) per case for skinless and boneless sardines. Only one million cases of sardines may be covered by guaranteed loans at any one time. Within their quotas, however, exporters may continually substitute new cases for exported cases covered under guaranteed loans. (United States Embassy, Rabat, August 18, 1964.)

Norway

EXPORTS OF CANNED FISH, JANUARY-JULY 1964:

Norway's total exports of canned fish during January 1 - July 4, 1964, were up 5.0 percent from those in the same period of 1963, due mainly to larger shipments of canned brisling and canned soft herring roe.

Norwegian Exports of Canned Fish		
Product	1/1/1-7/4 1964	1/1-7/6 1963
	. . (Metric Tons). .	
Brisling	3,035	2,607
Small sild	6,615	6,720
Kippered herring	1,555	1,627
Soft herring roe	968	497
Sild delicatessen	224	211
Shellfish	876	807
Other fishery products	1,593	1,694
Total	14,866	14,163

1/Preliminary.

The packing of sild sardines started in early May and by July 25, 1964, a total of 139,425 standard cases of small sild had been packed, compared with 154,184 standard cases in the comparable period of 1963.

The pack of brisling from the start of the season in late May to July 25, 1964, amounted to 278,485 standard cases, compared with 201,090 standard cases in the same period of 1963.

Mackerel landings for canning purposes totaled 147 tons as of July 11, 1964, compared with 487 tons in the corresponding period of 1963. (Norwegian Canners Export Journal, August 1964.)

* * * * *

HERRING FISH MEAL QUALITY CONTROL STUDIES:

The use of nitrite to preserve herring and other fish intended for industrial purposes was one of the main subjects discussed in a report on 1963/64 research activities of the Norwegian Research Institute of the Herring Oil and Meal Industry. The report was pre-

Norway (Contd.):

sented at the annual meeting of the Board of Representatives of the Fat Herring Fishermen's Marketing Cooperative which was held in Trondheim, Norway, August 27-28, 1964. Following are highlights of the report as published in Fiskaren, August 26, 1964:

Preservatives for Industrial Fish: A high-priority project is the development of preservatives for fish being transported to the reduction industry. The extension of the industrial fishery into distant waters has made this project particularly urgent.

Research is continuing on the possible production of toxins in industrial fish preserved with nitrite. The research is designed to determine what nitrite concentrations and conditions might cause toxic material to be produced. Investigators are also trying to determine whether nitrite together with any toxins present can be removed from industrial fish by adding acid or applying steaming treatments.

In the industrial fishery off Iceland, experiments are being conducted with lower than usual concentrations of nitrite in the preservation liquid. Also, steps have been taken to find better application equipment for vessels as well as for factories. In the meantime, there is every reason for the reduction industry to show the greatest care when using nitrite preservative. For that reason, the Norwegian Herring Meal Inspection Office has tightened its instructions and effected special measures for the use of nitrite.

Handling Fish Meal in Bulk: Storing and shipping herring meal in bulk can simplify transport requirements. Investigations have shown there is no problem with bulk shipments when airtight containers are used. An initial shipment of 100 metric tons of fish meal in bulk was sent to Sweden in the summer of 1964. The shipment proceeded normally and was discharged without difficulty.

Fish Meal Uniformity: In order to encourage the production of high-grade products, a premium is paid annually for herring meal which satisfies certain standards. Buyers are becoming increasingly quality-minded and have become particularly strict in their demand for uniformity. The Norwegian reduction industry with its varied raw material and decentralized industry has unusual problems in achieving uniformity. The installation of mixing equipment to achieve gradually the goal of uniformity seems to be necessary. In cooperation with the Norwegian Herring Fishermen's Producer Cooperative, the Research Institute has promoted the development of suitable silos and has helped 16 fish meal manufacturers design mixing equipment. (United States Embassy, Oslo, September 20, 1964.)

Panama

TUNA FISHING REGULATIONS FOR FOREIGN VESSELS IN PANAMANIAN WATERS:

To regulate foreign tuna fishing within its claimed territorial waters (12 miles), the Republic of Panama issued Decree No. 127 of July 28, 1964. Under the new decree licenses must be obtained, fees must be paid, and other requirements must be met by foreign fishermen who wish to operate tuna vessels within Panamanian waters.

The owner of such a foreign tuna vessel must obtain from Panamanian authorities (1) a permit issued by the Ministry of Agriculture, Commerce, and Industries; (2) a fishing license issued by the Department of Fisheries and Related Industries (good only during season of September 1 and August 30 of following year); and (3) a special navigation license issued by the Ministry of Finance and Treasury. A Panamanian tax of $5 per registered net vessel ton or fraction thereof on foreign tuna vessels operating in Panamanian waters has also been established.

The new decree sets up a number of other requirements which must be met by foreign tuna vessels off Panama. Some of those are: (1) every vessel which receives a Panamanian license for tuna fishing must purchase supplies, lubricants, fuel, and repair services in Panama rather than in the Canal Zone; (2) vessels which obtain Panamanian tuna licenses must employ at least two Panamanian sailors during the period when they are fishing in Panamanian waters; (3) at the end of each fishing season, fishing vessel owners must present a detailed report on the tuna catch (species caught and total catch) to the Panamanian Department of Fisheries and Related Industries.

The tuna fishing authorization does not include permission to catch other fishery species (such as sardine, herring, and shrimp). Foreign tuna fishing vessels are forbidden to use fishing equipment and techniques which might be harmful to local marine life in Panamanian waters. Foreign tuna fishing vessels are forbidden to sell fishery products within the territorial waters of Panama or its local markets without previous authorization by the Panamanian Ministry of Agriculture, Commerce, and Industries.

Penalties provided by the new Panamanian decree for violations are: (1) minimum fine of $1,000, maximum fine of $10,000, according to the seriousness of the offense; and (2) confiscation of the catch of the vessel involved. (United States Embassy, Panama, September 3, 1964.)

Peru

FISH MEAL AND OIL INDUSTRY TRENDS, JANUARY-JULY 1964 AND OUTLOOK IN SEPTEMBER 1964:

Outlook: Production and exports of fish meal were at a record level in Peru during January-July 1964, although Peruvian fish meal output in June and July 1964 was down from the extremely high levels reached in the early months of 1964 (table 1). Peru usually experiences a seasonal decline in fish meal production in the third quarter, with output expanding again in the latter part of the year. This year, however, there are uncertainties in the outlook for the anchoveta fishery, which is the mainstay of the Peruvian fish reduction industry. In an exploratory survey in early September 1964, the Peruvian Institute of Marine Resources swept three-fourths of the Peruvian coastal fishing area with some 35 vessels furnished by the reduction industry. Echo-sounding equipment did not reveal major concentrations of fish. That was disappointing because large schools of anchoveta have appeared off Peru in September during past years. Water temperature data were collected during the survey of the fishing areas. Analysis of those data may throw more light on anchoveta fishing prospects during the remainder of the year.

Fish Meal Supply Situation: On May 15, 1964, Peruvian stocks of fish meal totaled 271,544 metric tons (table 2).

Table 1 - Peruvian Fish Meal Production and Exports, January-July 1963-1964

Month	Production 1964	Production 1963	Exports 1964	Exports 1963
	. . (1,000 Metric Tons). .			
January	196	146	102	147
February	125	46	101	104
March	175	122	186	104
April	159	129	142	96
May	123	160	133	78
June	92	99	106	85
July	84	39	142	110
Total Jan.-July	954	741	912	724

Fig. 1 - In Peru, anchoveta boat waiting to unload at the Port of Chimbote.

Table 2 - Peruvian Fish Meal Supply Situation, Jan. 1-May 15, 1964 with Comparisons

Item	1964	1963	1962	1961
	. . . . (Metric Tons)			
Supply:				
Carryover stocks, January 1	156,372	192,884	156,774	76,985
Production, Jan. 1-May 15	710,201	512,599	388,113	314,061
Total available supply, Jan. 1-May 15	866,573	705,483	544,887	391,046
Disposition, Jan. 1-May 15:				
Exports	584,801	488,632	401,774	279,014
Other disposition 1/	10,228	10,388	5,375	8,685
Carryover stocks, May 15	271,544	206,463	137,738	103,347

1/Includes domestic sales in Peru (6,156 tons in January 1-May 15, 1964) and "other" unexplained disposition.

Those stocks were substantially reduced by heavy export shipments in mid-1964. During the period May 15-July 30, 1964, Peruvian fish meal exports amounted to 327,000 metric tons while Peruvian fish meal production amounted to only 243,000 metric tons. (Editor's Note: Peruvian fish meal

Table 3 - Peruvian Fish Meal Exports by Country of Destination, January 1-May 15, 1964

Country of Destination	Quantity
	Metric Tons
United States:	
East Coast	128,112
West Coast	23,084
Hawaii	495
Total United States	151,691
Germany, West	92,063
Germany, East	15,898
Austria.	500
Brazil	1,589
Belgium	16,221
Colombia	1,650
Czechoslovakia	10,700
Spain	19,218
Philippines	3,099
France	19,867
Netherlands	74,339
Hungary	14,199
Great Britain	23,139
Rumania	3,000
Italy.	24,121
Japan	59,057
Mexico	16,673
Poland	4,950
Sweden	6,175
Venezuela	7,574
Yugoslavia	18,397
Other countries 1/	681
Total all countries	584,801

1/Includes shipments to Argentina, Bolivia, Ecuador, El Salvador, and and Taiwan.

Peru (Contd.):

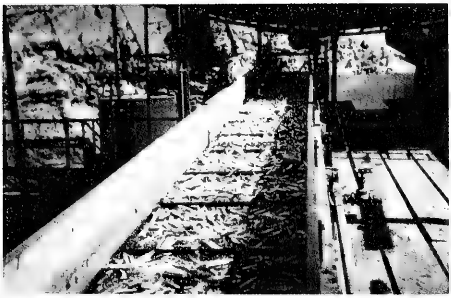


Fig. 2 - Conveyor belt carrying anchovies into fish meal plant for processing.

prices--for 65 percent protein meal f.o.b. United States East Coast and Gulf ports--increased from US$123-125 per short ton in late May 1964 to $133-137 per short ton in late September 1964.)

Fish Meal Exports by Country of Destination, January 1-May 15, 1964: The United States was the leading buyer of Peruvian fish meal during January 1-May 15, 1964, with 26 percent of total shipments, followed by West Germany with 16 percent, the Netherlands with 13 percent, and Japan with 10 percent (table 3).

Table 4 - Peruvian Marine Oil Exports by Country of Destination, January 1-May 15, 1964

Product and Country of Destination	Quantity
	Metric Tons
Crude Fish Oil:	
Germany	1,450
Netherlands	3,741
Total crude fish oil exports	5,191
Semirefined Fish Oil:	
Germany	7,415
Netherlands	10,959
Colombia	2,190
Czechoslovakia	1,750
Denmark	5,905
France	1,100
Norway	2,312
United Kingdom	280
Sweden	280
Total semirefined fish oil exports	32,191
Sperm Oil:	
Netherlands	400
Total marine oil exports	37,782

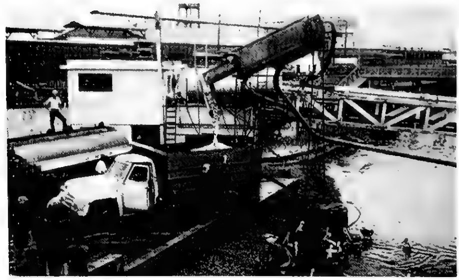


Fig. 3 - The fish are being pumped from the boat to awaitnig truck.

The Consorcio Pesquero del Peru S. A. (Fisheries Consortium of Peru) is the leading marketing agency for Peruvian fish meal exports. During January 1-May 15, 1964, the Consortium shipped 402,213 metric tons of fish meal or about 69 percent of total fish meal exports. The remainder was shipped by producers who do not belong to the Consortium.

Marine Oil Exports by Country of Destination, January 1-May 15, 1964: The leading buyers of Peruvian crude and semirefined fish oil during January 1-May 15, 1964, were the Netherlands and Germany (table 4). Sizable shipments of semirefined fish oil were also made to Denmark, Norway, Colombia, Czechoslovakia, and France. (United States Embassy, Lima, September 10, 1964.)

Philippines

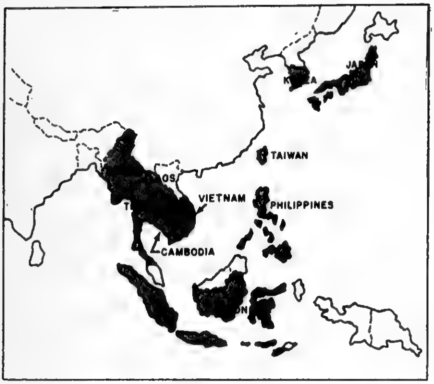
DEVELOPMENT OF FISHING INDUSTRY SPURRED BY CHANGE IN GOVERNMENT IMPORT POLICY:

The National Marketing Corporation (NAMARCO), a Philippine Government agency, will phase out its policy of importing canned fish tax free in order to stabilize the market for such products, and instead will rely on local production. The announcement was recently made by that Agency's General Manager. He added that to speed the development of the local fishing and canning industry NAMARCO will import tinplate and tomato paste tax free, so that local canneries will be able to establish themselves in the market and compete with imported products.

Taking advantage of NAMARCO's new policy, on August 17, 1964, Philippine and Australian interests formed a new company to engage in deep-sea fishing, fish storage, and canning. The new company was capitalized at 15 million pesos (US$4.3 million) and authorized to import its tinplate requirements tax free until 1967. An official of the firm, which is 60 percent Philippine and 40 percent Australian, estimated that the plant would begin operations by the middle of 1965. It will have an estimated annual output of 800,000 cases of sardines for local consumption, and 600,000 cases of tuna for export and for the Philippine market. It is anticipated that the major export market will be Australia, where Philippine canned fish will replace imports from Japan.

At the same time, the Philippine subsidiary of a United States firm is planning to extend its operations in the Philip-

Philippines (Contd.):



pines. The Philippine subsidiary, which is 51 percent American, reportedly has acquired a site for its operations, purchased the necessary equipment, commissioned the building of fishing vessels in Japan, and will go into operation in February 1965. Like the newly formed Philippine-Australian firm, the subsidiary of the United States company intends to export a part of its production of canned tuna and sardines to other markets but will sell most of it in the Philippines.

It was stated that NAMARCO's new policy would also result in increased output of a third Philippine cannery which is operating in the southern Philippines. Philippine Government officials, as well as the local business community, are confident that the policy change will boost Philippine production of canned fish from its present level of 60,000 cases a year to the point where it will eventually meet the national requirement of 2.4 million cases. (United States Embassy, Manila, August 25, 1964.)

Poland

FISHING VESSEL CONSTRUCTION PROGRAM:

The Government of Poland is planning to construct, during the next 5 years (1966-1970), 130 fishing vessels with a total deadweight tonnage of 346,000--averaging over 2,600 tons each. Like the vessels constructed in Poland during the previous 5-year plan (1961-1965), most of the new fishing vessels will go to the Soviet Union. During 1966-1970, Polish shipyards at Gdansk are scheduled to construct a total of 83 fishing vessels (24 large motherships and 59 stern factory trawlers). Other fishing vessels will be built at Gdynia and Szczecin. (Tygodink Morski, May 17, 1964, and Trybuna Ludu, August 8, 1964.)

The growing importance of Polish shipyards is related to the CEMA (Communist Common Market) Agreement under which Poland has been assigned the task of building ocean-going vessels for the entire Soviet Bloc. The average production costs during the 1966-1970 vessel construction plan are expected to be 10 percent below those of the 1961-1965 plan due to savings made possible by specialization and mass production. Also, fewer classes of vessels will be built.

Following is a report on the Polish fishing vessel construction industry which appeared in the Polish Maritime News, August 1964:

Construction of Large Fishing Vessels, 1963 and January-June 1964: Poland has important fishing vessel construction facilities at the ports of Gdansk, Gdynia, and Szczecin. In 1963, Poland was second only to Japan in total tonnage of fishing vessels constructed (table 1). The 15 large fishing vessels (of more than 100 gross tons) launched by Polish shipyards in 1963 included 7 refrigerated stern trawlers of 850 gross tons each, 6 factory stern trawlers of 2,670 gross tons each, and 2 factory motherships of 9,250 gross tons each.

Table 1 - World Launchings of Fishing Vessels (of More Than 100 Gross Tons), 1963 with Data for Leading Countries

Item	No. of Vessels	Gross Tonnage	Percentage of Total
Total world fishing vessel launchings1/	541	205,847	100.0
Launchings1/ by Leading Countries:			
Japan	230	80,183	38.9
Poland	15	40,470	19.7
Spain	93	23,128	11.2
German Federal Republic . . .	12	10,453	5.1
Netherlands . . .	49	9,932	4.8
France	45	9,816	4.8
Norway	39	9,416	4.6
Canada	23	5,193	2.5
Denmark	1	4,700	2.3
Great Britain . .	12	4,378	2.1

1/Excludes vessels of less than 100 gross tons.

Gdansk specializes in the construction of factory motherships and factory stern trawlers. Gdynia concentrates on building large fishing trawlers (other than factory trawlers.)

In the first half of 1964, Gdynia shipyards completed 3 trawlers ("B-23" type) of 850 gross tons each, and Gdansk shipyards com-

Poland (Contd.):

pleted 1 factory mothership ("B-64" type) of 9,250 gross tons and 2 factory trawlers of 2,670 gross tons each.

During the first half of 1964, Polish shipyards had under construction 7 large trawlers with a combined gross tonnage of 4,455 tons, 12 factory trawlers with a combined gross tonnage of 31,760 tons, and 5 factory motherships with a combined gross tonnage of 46,250 tons. Poland is building trawlers for France and Great Britain as well as for the Soviet Bloc.

Large Fishing Trawlers: Up to 1962, Gdynia shipyards built several types of side trawlers. In 1963, the first trawlers designed for fishing from the stern were delivered by Gdynia. Although a few side trawlers (type "B-20/II," "B-27/I," and "B-27/II") are still being built, the main emphasis has shifted to stern trawlers. The main specifications of fishing vessels under construction or planned at Gdynia are shown in table 2.

Certain planned trawler types ("PK-1322," "PK-1319," and "B-28") are designed primarily to deliver fresh fish, although they may be adapted to freeze part of their catch.

Trawlers designated "B-23," "B-29," and "B-18" are typical freezer trawlers designed to freeze their entire catch.

All the fishing vessels either under construction or planned will be provided with Diesel engines. In the past, propulsion was usually provided by reversible engines acting directly on solid propellers. But propulsion by nonreversible engines acting through a gear on an adjustable pitch propeller predominates at present.

One of the main reasons for adopting the latter propelling system is the great difference between the power needed for service speed and that needed for trawling. The main engine has surplus power at trawling speed. In order to use that surplus power, two generators are usually attached to the engine gear, one of which drives the trawl winch. There

Table 2 - Polish Trawler1/ Specifications by Main Vessel Types

Designation	Description of Vessel	Length Overall	Length Between Perpendiculars	Deadweight Tonnage	Hold Capacity	Propulsion2/	Trial Speed
		Meters	Meters	Metric Tons	Cubic Meters		Knots
B-20	Freezer stern trawler	61.55	55.10	500	519	Diesel--1,375 hp. at 275 r.p.m.	13.1
B-20/I	Starboard trawler	63.22	56.38	495	509	Diesel--with gear of "father and son" system--1,310 hp. at 400 r.p.m.	14.33
B-20/II	Starboard trawler	63.20	56.50	500	580	Diesel-1,800 hp. at 250 r.p.m.	15.00
B-27/I	Starboard trawler	47.43	42.50	215	295	Diesel--with gear--1,200 hp. at 380 r.p.m.	13.50
B-27/II	Starboard trawler	47.43	42.50	215	330	4 Diesel engines--with gear--1,200 h.p. at 1,250 r.p.m.	13.50
PK-1322	Stern trawler3/	43.72	38.00	200	300	Diesel--with gear--1,200 hp.	13.5
PK-1319	Stern trawler3/	50.10	44.00	300	400	Diesel--with gear--1,500 hp.	14.0
B-28	Stern trawler3/	56.50	50.00	400	500	Diesel--1,800 hp.	14.5
B-23	Freezer stern trawler	69.35	60.00	600	570	Diesel--with gear--1,600 hp. at 400 r.p.m.	14.0
B-29	Freezer stern trawler	75.50	68.00	800	1,150	Diesel--with gear--2,400 hp. at 500 r.p.m.	14.0
B-18	Freezer stern trawler	85.20	80.00	1,250	1,700	Diesel--2,250 hp. at 225 r.p.m.	13.80

1/Does not include factory trawlers.
2/All vessel types listed have an adjustable propeller except the "B-20," the "B-20/II," and the "B-27/I," which have a solid propeller.
3/Planned for future construction.
Note: To convert meters to feet multiply by 3.28 feet. To convert cubic meters to cubic feet multiply by 35.3147 cubic feet.

Poland (Contd.):

are also 1 or 2 generating sets in the power plant which are driven by separate Diesel engines.

That engine design assures good use of main-engine power under varying operating conditions. In addition, the electrical brake system of the trawl winch is simplified by using the engine gear to operate the trawl generator.

Emergency propulsion is fitted on some vessels. For example, on the "B-23" trawlers, the main engine can be disconnected in case of a defect. The propeller is in such case, driven by a generator attached to the gear. Power is provided by the auxiliary Diesel engine system.

The adopting of the stern-fishing method and the expansion of vessel freezing and processing facilities has brought a range of new appliances and innovations to trawling vessels. Stern-trawlers built at Gdynia are provided with a system of hydraulically-controlled blocks and fish chutes. Freezing installations on Polish trawlers include both horizontal plate freezers and blast-freezing tunnels. Some trawlers are equipped with conveyers for transferring frozen fish blocks to storage holds. Unloading conveyers have also been tried. Partitions of polyester laminates have been applied in fish holds recently. This saves weight and facilitates loading and unloading.

Small Fishing Vessels: In the early postwar period, Polish shipyards concentrated on small fishing cutters. Several types of small fishing vessels are still being built at "ship-repair" yards at Szczecin and Gdynia.

Four small side trawlers (of the "Storem" type) are being built at Szczecin for Indian owners. The specifications of the vessels are: length overall 17.6 meters (57.7 feet), length between perpendiculars 15.0 meters (49.2 feet), and deadweight tonnage 17.5 tons. The insulated fish hold has a capacity of 28.3 cubic meters (1,000 cubic feet). Each of the vessels is equipped with a 180-horsepower Diesel engine which provides a speed of 9 to 9.5 knots.

The "B-25-S" side-trawler (evolved from earlier "super" cutters) is built at Gdynia. The specifications of the "B-25-S" are: length overall 24.6 meters (80.7 feet), length between perpendiculars 21.85 meters (71.7 feet), deadweight tonnage (including fishing gear) 105 tons, and fish-hold capacity 100 cubic meters (3,531.5 cubic feet). The vessel has a 225-horsepower Diesel engine, a speed of 10 knots and an operating range of 3,500 miles. It usually carries a 9-man crew.

Polish shipyards have also started building the newly designed "T-27" small stern-trawler. The main specifications of the "T-27" are length overall 27.5 meters (90.2 feet) and length between perpendiculars 23.7 meters (77.7 feet). Propulsion is by a 450-horsepower Diesel engine with gear and adjustable propeller which drives the vessel at about 11 knots. The "T-27" can remain at sea about 20 days with its standard fuel tank with a capacity of 40 cubic meters (1,412.6 cubic feet). The fish hold, which has a capacity of about 135 cubic meters (4,767.5 cubic feet), is cooled to about 0° C. (32° F.). The power plant and hydraulic trawl winches are controlled from the wheel house. The vessel can be equipped with machinery for preliminary fish processing such as heading fish and grinding fish waste.

Another newly designed Polish vessel is the "K-17" small seiner. The main specifications of the vessel are: length overall 19.6 meters (64.3 feet), length between perpendiculars 16.8 meters (55.1 feet), and fish-hold capacity 40 cubic meters (1,412.6 cubic feet). Propulsion is by a 230-horsepower Diesel engine with gear and adjustable propeller. Using full power, the vessel's operating range is 6 days on its standard 40-cubic-meter (1,412.6 cubic feet) fuel tank. Service speed is 9.5 knots.

Note: See Commercial Fisheries Review, June 1964 p. 55, May 1964 p. 71, Mar. 1964 p. 71, and Feb. 1964 p. 80.

Senegal

FOUR TUNA VESSELS TO BE PURCHASED FROM BRITISH:

A £500,000 (US$1.4 million) Bank of England loan to Senegal for the acquisition of four 30-meter (98 feet) steel-hulled tuna vessels was confirmed by an agreement between the Government of Senegal and Great Britain. The agreement was signed June 15, 1964, by Senegal's Minister of Plan and the British Ambassador to that country. (United States Embassy, Dakar, July 22, 1964.)

South Africa Republic

TUNA VESSEL DELIVERS GOOD CATCHES:

About 100 short tons of tuna with an ex-vessel value of about R28,000 (US$39,200) was landed June 5, 1964, at Table Bay (Cape west coast) by the 108-foot refrigerated tuna vessel Marinette. That was the vessel's best catch since she began fishing for tuna in 1963 after conversion from cargo-hauling work. (The Marinette had delivered a previous record catch of 60 tons earlier in 1964.) The June tuna delivery was taken during a 21-day long-lining trip. During 3 days of the trip, the Marinette was assisted by a catcher vessel. Plans call for the Marinette to be assisted during future trips by two 45-ton catcher vessels--the Vollendam and the Bressa. With the assistance of the catcher vessels, the Marinette should be able to cut the length of her fishing trips down to about 10 days. All 3 vessels, however, are equipped to spend 40 days at sea. The Marinette has a crew of 4 officers and 16 men, and each catcher vessel has a skipper and a crew of 8. (The South African Shipping News and Fishing Industry Review, June 1964.)

Note: See Commercial Fisheries Review, March 1964 p. 67 and Nov. 1963 p. 78.

* * * * *

NEW ANCHOVY FISHERY MAY DEVELOP RAPIDLY:

Five South African fishing vessels caught 7,800 short tons of anchovy off the Cape west coast during April-May 1964. During that period, the anchovy fishery was limited to vessels equipped with the special $\frac{1}{2}$-inch mesh knotless purse-seine nets imported for experimental purposes. Rapid expansion is expected in the fishery, however, as more nets--costing about R8,000 (US$11,200) each--are imported. It is expected that 3 anchovy nets will be imported by each of 14 fish meal factories in the South Africa Republic.

Large shoals of anchovy have been seen off Walvis Bay in South-West Africa, according to the Namib Times. It is believed that South-West African fish meal factories will also be allowed to import a limited number of the anchovy nets, raising the total number of anchovy nets in South Africa to over 50 and the total investment in the nets to over R400,000--or $560,000. (The South African Shipping News and Fishing Industry Review, June 1964.)

Notes: (1) South African rand 1.00 equals US$1.40.
(2) See Commercial Fisheries Review, Aug. 1964 p. 84.

* * * * *

PRODUCTION OF LEADING PROCESSED FISHERY PRODUCTS, 1962-1963:

In 1963, record production of fish meal at Walvis Bay in the Territory of South-West Africa offset a modest decline in fish meal output on the Cape west coast of South Africa. On the other hand, South African canned fish production was down sharply in 1963 at both Walvis Bay and Cape west coast factories.

In spite of the decline in output in 1963, South African canned fish production continued to yield a large export surplus. Domestic consumption of the 3 leading South African canned fishery products (pilchards, maasbanker, and mackerel) in 1963 amounted to 14,400 short tons (mainly pilchards), or only 32.5 percent of total output. (United States Consulate, Cape Town, September 4, 1964; and other sources.)

Production of Leading Processed Fishery Products in the South Africa Republic and the Territory of South-West Africa, 1962-1963

Product	Unit	South Africa		South-West Africa		Total South Africa and South-West Africa	
		1963	1962	1963	1962	1963	1962
Canned:							
Pilchard	Short tons	8,445	7,344	32,053	66,712	40,498	74,056
Maasbanker	" "	2,090	9,595	-	-	2,090	9,595
Mackerel	" "	1,719	3,947	-	-	1,719	3,947
Total	Short tons	12,254	20,886	32,053	66,712	44,307	87,598
Cured & Salted:							
Maasbanker	Short tons	1,959	5,000	-	-	1,959	5,000
Industrial:							
Fish meal	Short tons	111,068	126,000	1/140,000	98,773	251,068	224,773
Fish-body oil	1,000 imp. gals.	6,765	8,295	1/4,500	1/4,000	11,265	12,295
Whale oil	Long tons	5,886	5,892	-	-	5,886	5,892
Sperm oil	Long tons	10,780	10,283	-	-	10,780	10,283
Seal oil	1,000 imp. gals.	16	1/16	63	39	79	55

1/Estimated.

* * * * *

FISHERIES CATCH, 1963:

The pilchard catch taken in the pelagic shoal fishery made up the bulk of the 1963 fisheries catch in the South Africa Republic and the Territory of South-West Africa. Landings of spiny lobster, hake, and snoek contributed substantially to the value of the 1963 catch. The newly developed tuna fishery in South Africa yielded a catch of 2,500 tons valued at R300,000 (US$417,000) in 1963 (see table).

South Africa Fisheries Catch and Ex-Vessel Value, 1963

Catch by Fishery and Species	Republic of South Africa			Territory of South-West Africa			Total South Africa and South-West Africa Combined		
	Quantity	Value		Quantity	Value		Quantity	Value	
	Short Tons	R1,000	US$1,000	Short Tons	R1,000	US$1,000	Short Tons	R1,000	US$1,000
Trawl Fishery:									
Hake	75,175	3,817.3	5,306.0	-	-	-	75,175	3,817.3	5,306.0
Spiny lobster1/ . .	106	66.3	92.2	-	-	-	106	66.3	92.2
Other species . .	2/37,193	2/1,310.4	1,821.5	1,055	130.0	180.7	38,248	1,440.4	2,002.2
Total trawl fishery	112,474	5,194.0	7,219.7	1,055	130.0	180.7	113,529	5,324.0	7,400.4
Pelagic Shoal Fishery:									
Pilchard	441,943	3/3,942.1	5,479.5	602,000	4/5,177.2	7,196.3	1,043,943	9,119.3	12,675.8
Maasbanker . . .	26,400	3/235.5	327.3	-	-	-	26,400	235.5	327.3
Mackerel	14,824	3/132.2	183.8	-	-	-	14,824	132.2	183.8
Total pelagic shoal fishery .	483,167	3/4,309.8	5,990.6	602,000	4/5,177.2	7,196.3	1,085,167	9,487.0	13,186.9
Other Line and Net Fisheries:									
Snoek	4,500	5/900.0	1,251.0	2,250	5/270.0	375.3	6,750	1,170.0	1,626.3
Tuna (dressed weight)	2,500	6/300.0	417.0	-	-	-	2,500	300.0	417.0
Dogfish and other shark	2,500	7/	7/	-	-	-	2,500	7/	7/
Total other line and net fisheries	9,500	1,200.0	1,668.0	2,250	270.0	375.3	11,750	1,470.0	2,043.3
Shellfish Fishery:									
Spiny lobster (whole)	9,300	5/2,790.0	3,878.1	8,021	5/1,600.0	2,224.0	17,321	4,390.0	6,102.1
Abalone (meat only)	3,000	5/900.0	1,251.0	-	-	-	3,000	900.0	1,251.0
Total shellfish fishery	12,300	3,690.0	5,129.1	8,021	1,600.0	2,224.0	20,321	5,290.0	7,353.1

1/Trawler catch off Natal; main South African lobster catch listed below under "Shellfish Fishery."
2/Includes 20,952 tons of offal valued at only $36,709 (US$51,026).
3/Based on season landings price of R7.95 ($11.05) per ton, plus bonus of R0.97 ($1.35) per ton paid at end of season on the basis of international sales results.
4/Based on fixed landings price of R8.60 ($11.95) per ton.
5/Estimated.
6/Based on an average price of R120 ($166.80) per ton.
7/Not available.
Notes: (1) South African rand 1.00 equals US$1.39.
(2) Table does not include whale and seal catch.

Part of the Cape Town fleet engaged in the South African spiny lobster fishery.

South African whalers took 4,455 whales from the Indian and Atlantic Oceans in 1963. That total included 2,651 sperm whales and 1,092 sei whales.

In 1963, the Territory of South-West Africa reported a seal catch of 42,412 pups and 3,391 bulls, and the South Africa Republic reported a seal catch of 6,749 pups and 2,109 bulls. (United States Consulate, Cape Town, August 25, 1964.)

* * * * *

DOMESTIC CONSUMPTION OF LEADING PROCESSED FISHERY PRODUCTS, 1963:

Although exports are the major factor in the South African fishing industry, domestic consumption of some products is also sub-

South Africa Republic (Contd.):

stantial. The domestic market absorbs the bulk of South African production of fresh, frozen, and cured finfish products. A considerable quantity of canned fish and frozen spiny lobster tails is also consumed locally.

Domestic Consumption of Leading Processed Fishery Products Prepared in the South Africa Republic and the Territory of South-West Africa, 1963

Product	Unit	Quantity
Canned pilchards, maasbanker, and mackerel	Short tons	1/14,400
Canned spiny lobster	" "	2/2.5
Frozen spiny lobster tails	" "	2/250
Fresh, frozen, and cured finfish .	" "	2/77,500
Industrial Products:		
Fish meal	" "	28,000
Whale meat meal	Long tons	700
Fish-body meal	" "	10,500
Whale oil	" "	1,000
Sperm oil	" "	200

1/Consists of 800,000 cases.
2/Estimated.

Among the industrial products, domestic consumption accounted for only about 11 percent of total South African production of fish meal. Fish-body oil, whale oil, and sperm oil are also produced primarily for export markets.

The South Africa Republic imports only a small quantity of edible and industrial fishery products for the domestic market. (United States Consulate, Cape Town, September 4, 1964.)

* * * * *

FIBERGLASS VESSEL SUCCESSFUL IN PILCHARD FISHERY:

The 67.5-foot fiberglass vessel Western Dawn was reported to be having a good season in the 1964 pilchard fishery off the Cape west coast of South Africa. The "sandwich" principle was used in constructing the hull when the vessel was built in 1963. Since then the hull has withstood all tests. There was no sign of wear even after the vessel unloaded in heavy weather. In mid-1964 the vessel brought in a catch of 124 short tons in bad weather. The only maintenance the hull requires is a semiannual removal of marine growths and a yearly underwater inspection.

The vessel is equipped with fish-finding and echo-sounding equipment, power block, and hydraulic steering with control positions in the wheelhouse and in the bow. Powered by a 220-horsepower Diesel engine, the vessel has a speed of 11 knots, making it one of the fastest vessels in the South African fishing fleet. (The South African Shipping News and Fishing Industry Review, June 1964.)

Note: See Commercial Fisheries Review, Nov. 1963 p. 79.

Taiwan

ITALY AND TAIWAN TO SIGN FISHERY COOPERATION AGREEMENT:

Taiwan and Italy were expected to sign a fishery cooperation agreement, according to a foreign dispatch from Taipei. Under that agreement, the Taiwan Nationalist Government will sell tuna to Italy and will use the payments to build tuna vessels in Italy.

Taiwan's current annual tuna production is reported to be around 6,000 metric tons, of which half is exported to foreign countries. The Nationalist Government is building thirteen 300-ton vessels and three 1,000-ton tuna vessels with loans obtained from the World Bank. Upon completion of those vessels, Taiwan's annual tuna production is expected to increase to 10,000 tons. (Minato Shimbun, August 28, 1964.)

U.S.S.R.

FISHERY LANDINGS IN 1964 EXPECTED TO SURPASS CATCH TARGET:

Soviet fisheries landings (fish, shellfish, and whales) in 1964 will probably exceed the 4.9-million-metric-ton catch target established for the year. The total Soviet catch during the first quarter of 1964 was 7 percent higher than in the same period of 1963. (Rybnoe Khoziaistvo, No. 6 (1964), and other sources.)

Some of the Soviet Far Eastern fishing fleets reported total landings during the first 8 months of 1964 which exceeded those made during the same period in 1963 by 25-35 percent and exceeded the planned catch by 15 to 25 percent. In August 1964, the Soviet Atlantic catch was also reported to be considerably above the planned catch. Since Atlantic and Pacific fisheries landings make up almost three-fourths of all Soviet landings, it can be estimated that by

U.S.S.R. (Contd.):

the end of 1964 Soviet fisheries landings will probably be about 10 percent higher than planned. That would give the Soviet Union a total 1964 catch approaching 5.5 million tons, an all-time record.

* * * * *

FISHERY DEVELOPMENTS:

According to a Soviet press release, dated August 1, 1964, the U.S.S.R. Fisheries Bureau chief of Kaliningrad, one of the major Baltic Sea fishing ports in the Soviet Union, stated that a total of 232 Soviet vessels (comprising the Soviet Atlantic fishing fleet based at Kaliningrad) were operating in the Atlantic Ocean as of August 1964. The Kaliningrad fleet reportedly consists of 201 fishing vessels, 8 factoryships, 14 freezerships, 7 tankers, and 2 towed vessels.

Another Soviet press report, dated August 18, indicates that Soviet and Cuban researchers are conducting joint fishery investigations in the Caribbean Sea aboard a Soviet research vessel. (Suisancho Nippo, August 26, 1964.)

* * * * *

TEN FREEZER-TRANSPORT VESSELS BUILT IN SWEDEN FOR SOVIET FISHING FLEET:

Sudoimport, Moscow, ordered 10 freezer-transport fishery vessels from shipyards in Goteborg, Sweden, in 1963. Six of those vessels had been launched by mid-1964, including 2 which were built under subcontract at a shipyard in Uddevalla, Sweden (see table). The new vessels will freeze, store, and transport fish for the Soviet fishing fleet. The refrigerated areas of the vessels are designed to maintain a temperature of -30 C. (-22° F.). For loading and unloading, the vessels are equipped with endless conveyor belts. At the launching of the Kamchatskie Gory, it was reported that the vessel's loading equipment would be capable of handling 800 tons in 18 hours. Processing equipment is not being installed on the vessels at the Swedish shipyards.

Sudoimport also ordered two floating docks from a shipyard in Goteborg, Sweden, in 1963. One of the floating docks was completed in the summer of 1964 and towed to its destination at Novorossijsk on the Black Sea, where it is being used in vessel repair work. The floating dock has a lifting capacity of 27,000 tons and can accommodate vessels up to about 45,000 tons deadweight in drydock. The floating dock has a length of 218 meters (715 feet) and a width of 40.5 meters (133 feet). Accommodations are provided for about 30 men. The dock develops its own electric power from a 15,000-kilowatt station. The second dock is under construction.

The launching of the freezer-transport Carl Linne in June 1964 coincided with the visit of the Soviet Premier to Sweden. During his visit to Goteborg, the Soviet Premier stated that 152 vessels were being built abroad for the Soviet Union and that 60 of those would be launched in the summer of 1964. (United States Consul, Goteborg, August 13, 1964.)

Delivery Schedule and Specifications of Ten Freezer-Transport Fishery Vessels Ordered by Sudoimport from Swedish Shipyards in 1963

Construction Site	Name of Vessel	Launching Date	Scheduled Year of Delivery	Approximate Specifications
Goteborg	Priboj	February 14, 1964	1964	Length, overall--515 feet Beam, molded--69.5 feet Dead weight tonnage--about 7,800 tons Refrigerated cargo capacity--451,400 cubic feet Speed, loaded--17.5 knots Power--8,750 hp. at 112 r.p.m. Refrigerated areas designed to maintain a temperature of -30° C. (-22° F.)
"	Khibinskie Gory	April 14, 1964	-	
"	Carl Linne	June 24, 1964	-	
"	1/	1/	-	
Uddevalla	Krymskie Gory	April 23, 1964	-	
"	Uraljskie Gory	June 26, 1964	1964	
Goteborg	Kamchatskie Gory	May 5, 1964	1964	Length, overall--497 feet Beam, molded--67 feet Dead weight tonnage--about 8,000 tons. Refrigerated cargo capacity--450,000 cubic feet Speed--17 knots Power--8,750 hp. at 112 r.p.m.
"	Sahalinskie Gory	1/	1965	
"	Sajanskie Gory	1/	-	
"	Altajskie Gory	1/	1965	

1/Not available.

* * * * *

U.S.S.R. (Contd.):

CONSTRUCTION OF FACTORYSHIP FOR NORTH PACIFIC NEAR COMPLETION: The eighth Soviet factoryship of the Zakharov class being constructed at the Leningrad Admiralty Shipyard is nearing completion. It is named the Mikhail Tukhachevskii and is designed for use as a cannery as well as for manufacture of fish meal and oil. The new vessel will have a displacement of about 16,000 gross tons, is 538 feet long, and will have a crew of about 600 (40 less than the first vessel of this type).

This new Soviet factoryship will be used in the Pacific with the rest of the Zakharov fleet; the factoryships process crab meat off Alaska in the spring and saury off the Kuriles in late summer and the fall. It is reported that reductions in personnel on those vessels have been made possible by additional automation of production lines. An earlier Soviet report indicated that the number of personnel may be reduced by 115 persons by the time the final vessel of this series is completed.

United Kingdom

REPORT ON FISH BOXED AT SEA: The British trawler Arlanda landed 30 boxes of cod and haddock at the port of Fleetwood early in August 1964. On the Icelandic fishing grounds, the fish had been stored in metal boxes soon after it was caught as part of experiments being carried out by the Industrial Development Unit of the White Fish Authority. Similar tests in boxing fish at sea were carried out at the fishing port of Hull in December 1963 but this was the first one at Fleetwood.

From a scientific point of view the Arlanda experiment was considered a success, but there were other factors to consider including the important one of cost. It took longer to box the fish than to stow it in the traditional way and this made it a more costly operation. The boxes were numbered, indicating when the fish were caught--during the early part of the trip or toward the end.

There was little doubt, said a White Fish Authority spokesman, that the boxed fish was superior in quality to similar fish caught at the same time. This view was endorsed by a spokesman for the wholesale firm which bought the fish and was cooperating in the tests. He said that even the 15-day-old fish was in first-class condition, and that it filleted well, and the weight was good.

The boxed fish was sent to Birmingham, where it was sold in retail fish stores. The store managers were asked to make a note of which customers bought the fish, and they were asked to give a report on its quality and taste when it was cooked. In this way it was possible to keep a check on the fish from the sea to the table to find out, among other things, how it kept.

The owners of the Arlanda said that they had been happy to cooperate in the experiment. It was probable that more tests of a similar nature would be carried out aboard the trawler. The opinion of the vessel owners was that Fleetwood had always been noted for its high quality fish and anything which could be done to maintain or improve the quality was worth trying.

These tests by the White Fish Authority with the cooperation of trawler owners in Hull and Fleetwood have demonstrated that boxing fish at sea in distant-water trawlers would have a number of important advantages, according to a report issued in mid-August 1964.

The report states that this method of stowing the catch is common practice in certain sections of the inshore fleet and in one trawler fleet fishing near and middle waters, but although it has been advocated for many years by the Torry Research Station it has not hitherto been used in the distant-water fleet.

Among the advantages are improved quality of catch, absence of damage during discharge, ease of discharge, avoidance of mixing fish caught on different days, and improved fillet yields. The fish can remain undisturbed in ice until the time of filleting, and this should give a further improvement in "shelf life," especially in summer.

The results have been sufficiently good to justify the planning of a full-scale test in a trawler yet to be selected. The main purpose will be to establish whether the problems of handling large quantities of boxes, and of sorting the catch, can be overcome in a distant-water trawler. It is believed that if the fish hold is modified specifically for boxing, the crews will find little difficulty in the new methods.

United Kingdom (Contd.):

In the tests so far carried out fish were stowed in boxes at various stages in the trip while other fish caught at the same time were stowed in the conventional manner, either by bulking or by shelfing.

Comparisons made by the Torry taste panel, port inspectors, and members of the trade indicated an improvement of 1 to $1\frac{1}{2}$ days in "shelf life" for early-caught cod and haddock stowed in boxes. Improvements in fillet yield of up to 5 percent have been measured, while wastage due to hook damage is completely eliminated.

Measurements indicate that the likely variation in weight of fish in a given number of boxes can be predicted, and that with wide experience a fairly constant weight can be achieved by the crews.

The main deterrent to the trawler owner may therefore be the cost of modifying the hold and of providing the boxes. Since the method appears to have a number of advantages for the wholesale merchant and processor, some of which are directly measurable in financial terms, it would seem reasonable for him to encourage the adoption of the new method by passing on some of the benefits in the form of slightly higher auction prices.

Improvement in quality is possible only if the design of the box and the method of packing the fish and ice follow very closely the requirements laid down by the Torry Research Station; for example, the drainage from one layer of boxes should not pass through the fish and ice in the layer below. To design suitable boxes which at the same time avoid waste of hold space to an unacceptable degree, and which when empty can be "nested" so as to provide room for working and for ice, is difficult.

The specification prepared by the Authority's Industrial Development Unit took all those factors into account and attractive designs in both light alloy and plastic have been put forward by specialist manufacturers. The first full-scale tests will employ light alloy boxes since production runs of plastic boxes are economical only when the design has been finally proved and accepted. (Fish Trades Gazette, August 8 and 22, 1964.)

* * * * *

SALMON AND TROUT FARMING METHOD DEVELOPED IN NORWAY ATTRACTS INTEREST:

In July 1964, a large British firm announced that it had acquired rights to use a Norwegian method for breeding and rearing salmon and trout. The new salmon farming technique was developed by two experimenters in Sykkylven, Norway. Under the Norwegian method, baby salmon and trout are periodically transferred to ponds of gradually increased salinity as they develop, thus introducing them to salt water at a much earlier stage than under natural conditions. It has been said that trout can develop from the egg to a size of 5 pounds within 2-1/2 years under the new rearing method.

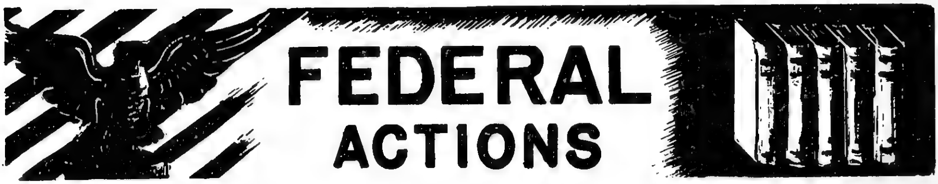
The Norwegian experiments have already aroused considerable interest in Scotland, as several people who have been to Sykkylven have established similar fish farms in the Scottish lochs. One such venture (now in its second year of operation at Loch Sween) has a stock of 250 salmon and 6,000 rainbow trout.

The possibility of establishing a large-scale commercial fish farm to rear salmon and trout is being studied by the North of Scotland Hydro-Electric Board, with the aim of finding a solution to some of the social and economic problems of the Highlands and helping to counteract the present drift of population from the area. The British firm which has acquired rights to the new fish-breeding method is also said to be considering the Scottish lochs as likely areas for the development of their project. (Fish Trades Gazette, London, July 11, 1964.)

* * * * *

FIRST SHIPMENT OF SMOKED SHARK FILLETS MARKETED:

Smoked shark fillets made their first appearance in Britain when they were offered as a delicacy by London's Billingsgate market in July 1964. The marketing venture is being watched with interest by fishermen at the port of Looe, Cornwall (southern England), where as many as 6,000 sharks are landed in a good year. A fishermen's representative at Looe strongly recommended the shark fillets: "It is very nice to eat, but very sweet." He indicated, however, that a new name for the product would aid marketing prospects. (Fish Trades Gazette, July 25, 1964.)



FEDERAL ACTIONS

Civil Service Commission

EDUCATIONAL REQUIREMENTS FOR FEDERAL OCEANOGRAPHERS: Minimum educational requirements for Federal positions in the Oceanographer Series, GS-1360-0, have been established by the Civil Service Commission and published in the Federal Register of August 28, 1964. Stating the reasons for the requirements, the Civil Service Commission said, in part, "The duties of these positions cannot be performed successfully without formalized training either in oceanography or in a combination of the basic physical sciences which provide fundamental scientific knowledges applicable or adaptable to exploring, examining, and understanding ocean phenomena. . . ."

Complete details of the educational requirements for Federal oceanographer positions as published follow:

CIVIL SERVICE COMMISSION

OCEANOGRAPHERS

Minimum Educational Requirements

In accordance with section 5 of the Veterans' Preference Act of 1944, as amended, the Civil Service Commission has decided that minimum educational requirements are necessary for positions in the Oceanographer Series, GS-1360-0. These requirements, the duties of the positions, and the reasons for the Commission's decision that these requirements are necessary are set forth below.

OCEANOGRAPHER SERIES, GS-1360-0

(ALL GRADES)

Minimum educational requirements. For Oceanographer positions, all grades, applicants must have successfully completed requirements in A, B, or C below:

A. A full four-year course of study in an accredited college or university leading to a bachelor's degree with major study in oceanography, physics, chemistry, mathematics, geophysics, meteorology, or earth science. The completed study must have included at least 24 semester hours in any combination of oceanography, physics, chemistry, and mathematics if it has included courses in differential and integral calculus.

B. At least 24 semester hours of oceanography, physics, chemistry, and mathematics if it has included courses in differential and integral calculus, in an accredited college or university, combined with pertinent work experience in the field of oceanography totaling four years of education and experience. This combination of education and experience must have provided the applicant with the equivalent of four years of education comparable in type, scope and thoroughness to that required under paragraph A above. The work experience must have been of such a nature as to demonstrate that the applicant can perform the professional work of oceanography.

C. The successful completion of a full four-year curriculum of study in an accredited college or university leading to a bachelor's degree with major study in geology, engineering, or a biological science may be accepted in lieu of the above educational requirement, provided that (a) the candidate demonstrates a good knowledge of oceanography, (b) the candidate has at least one year of professional experience or training in oceanography or a closely allied field; and (c) the total education and experience clearly demonstrate possession of those knowledges and abilities required for performance of the work of the position to be filled. The completed study must have included at least 24 semester hours in any combination of oceanography, physics, chemistry, and mathematics if it has included courses in differential and integral calculus.

The foregoing requirements of "a good knowledge of oceanography" typically involve one of the following:

(1) Undergraduate or graduate courses in oceanography; or

(2) Graduate-level courses in mathematical, biological or physical sciences, supplemented by experience or independent study in oceanography; or

(3) Research or survey experience, e.g., as a biologist, geologist, or engineer, which involved intensive investigation of problems in oceanography.

For positions engaged in basic and/or applied research, applicants must have successfully completed a full four-year course of study, in an accredited college or university, leading to a bachelor's or higher degree in an appropriate field of science as described in paragraph A or C.

Duties. Oceanographers plan and conduct scientific surveys, and examine selected ocean data at sea or on land; they collect, analyze, evaluate, coordinate and interpret information derived

both scientifically and empirically from the ocean and its surroundings. Some oceanographers plan, organize, conduct and administer basic and applied research in laboratories at sea and on land. In general, these scientists are concerned with research on and studies of tides, sea ice, currents, waves and other ocean events in terms of their temperatures, densities, circulation, motion, sound propagation, transparency, and similar characteristics. They are also concerned with the interaction and relationships between the ocean bottom, sea and atmosphere, including animal or plant life in the ocean, as these affect the particular ocean phenomena under study.

Reasons for the requirements. The duties of these positions cannot be performed successfully without formalized training either in oceanography or in a combination of the basic physical sciences which provide fundamental scientific knowledges applicable or adaptable to exploring, examining, and understanding ocean phenomena. Oceanographer at the minimum must have a thorough knowledge of basic scientific methods and procedures which may be adapted to oceanographic work. Appointees must have the ability to apply their professional and scientific knowledge to their work in order to solve specific problems, interpret and apply the results of research (both in oceanography and in the applicable basic sciences), or do oceanographic research. These knowledges can be acquired only through the successful completion of a directed course of study in an accredited college or university which has scientific libraries, well equipped laboratories, and thoroughly trained instructors who can evaluate the progress of the professional and scientific training competently.

UNITED STATES CIVIL SERVICE COMMISSION,
[SEAL] MARY V. WENZEL,
Executive Assistant to the Commissioners.

Department of Commerce

AREA REDEVELOPMENT ADMINISTRATION

TECHANICAL ASSISTANCE PROJECT IN ALASKA TO AID EARTHQUAKE-DAMAGED AREAS:

Approval of a $13,000 technical assistance study to help generate permanent jobs in earthquake-damaged communities in Alaska was announced September 1, 1964, by the Area Redevelopment Administration (ARA) of the U.S. Department of Commerce.

Cities to be surveyed by the 10-week project include Anchorage, Kodiak, Seward, Cordova, and Valdez. The Alaska State Department of Economic Development requested the project on an urgent basis to help provide permanent jobs for reconstruction workers when their present rebuilding jobs are completed.

The primary objective of the study will be the identification of specific development opportunities for new and established industries. A survey team consisting of specialists from two firms in Washington, D. C., will evaluate problems and potentials in each of Alaska's resource fields and recommend primary industries with the best capabilities for development. A list of priorities will also be established for further and more intensive study.

Department of the Interior

FISH AND WILDLIFE SERVICE

REVISED STANDARDS FOR GRADES OF FROZEN FISH BLOCKS:

Revised standards for grades of frozen fish blocks became effective October 9, 1964, after publication in the Federal Register, September 9, 1964, by the U.S. Department of the Interior. The revised standards were issued as an amendment to Part 263 of Title 50, Code of Federal Regulations, and supersede the standards that have been in effect since July 1958. The revised standards reflect a higher quality product through a general tightening of the critical quality factors as compared to the old standards.

The standards are used by industry in buying fish blocks from foreign sources for use in the manufacture of Grade A fish portions and fish sticks.

Following are the revised standards for grades of frozen fish blocks as published in the Federal Register, September 9, 1964:

Title 50—WILDLIFE AND FISHERIES

Chapter II—Bureau of Commercial Fisheries, Fish and Wildlife Service, Department of the Interior

SUBCHAPTER G—PROCESSED FISHERY PRODUCTS, PROCESSED PRODUCTS THEREOF, AND CERTAIN OTHER PROCESSED FOOD PRODUCTS

PART 263—UNITED STATES STANDARDS FOR GRADES OF FROZEN FISH BLOCKS

On page 7568 of the FEDERAL REGISTER of June 12, 1964, there was published a

notice and text of a proposed amendment of Part 263—United States Standards for Grades of Frozen Fish Blocks—of Title 50, Code of Federal Regulations.

Interested persons were given until July 13, 1964, to submit written comments, suggestions or objections with respect to the proposed revised part. No responses to the proposal were received. The proposed revised part is hereby adopted without change and is set forth below.

The revised part is issued pursuant to sections 203 and 205 of Title II of the Agricultural Marketing Act of 1946, 60 Stat. 1087 (1946), 7 U.S.C. 1622 and 1624 (1958) as transferred to the Department of the Interior by section 6(a) of the Fish and Wildlife Act of 1956, 70 Stat. 1122 (1956), 16 U.S.C. 742e (1958).

This part shall become effective at the beginning of the 30th calendar day following the date of this publication in the FEDERAL REGISTER.

STEWART L. UDALL,
Secretary of the Interior.

SEPTEMBER 2, 1964.

PART 263—UNITED STATES STANDARDS FOR GRADES OF FROZEN FISH BLOCKS [1]

AUTHORITY: The provisions of this Part 263 issued under sec. 6, 70 Stat. 1122; 16 U.S.C. 742e; and secs. 203 and 205, 60 Stat. 1087, 1090, as amended; 7 U.S.C. 1622, 1624.

§ 263.1 Description of the product.

Frozen fish blocks are rectangular-shaped masses of cohering frozen fish flesh of a single species. They consist of adequately drained whole, wholesome fillets or pieces of whole, wholesome fillets cut into small portions but not ground or comminuted; and they are frozen and maintained at temperatures necessary for the preservation of the product. Frozen fish blocks are made in two styles.

(a) *Style I—skinless fish blocks.* Fish blocks that have been made from skinless fillets.

(b) *Style II—skin-on fish blocks.* Fish blocks that have been made from demonstrably acceptable skin-on fillets.

§ 263.2 Grades of frozen fish blocks.

(a) "U.S. Grade A" is the quality of frozen fish blocks that (1) possess a good flavor and odor and that (2) have a total score of 85 to 100 points for those fa tors that are rated in accordance with the scoring system outlined in this part.

(b) "U.S. Grade B" is the quality of frozen fish blocks that (1) possess at least a reasonably good flavor and odor and that (2) have a total score of 70 to 84 points for those factors that are rated in accordance with the scoring system in this part.

(c) "Substandard" is the quality of frozen fish blocks that meet product description but fail to meet the requirements of U.S. Grade B.

§ 263.11 Determination of the grade.

The grade is determined by examining the product in the frozen, thawed, and cooked states and is evaluated by considering the following factors:

(a) *Factors rated by score points.* Points are deducted for variation in the quality of each factor in accordance with the schedule in table 1. The total of points deducted is subtracted from 100 to obtain the score. The maximum score is 100; the minimum score is 0.

(b) *Factors not rated by score points.* The factor of "flavor and odor" is evaluated organoleptically by smelling and tasting the product after it has been cooked in accordance with § 263.21(c).

(1) Good flavor and odor (essential requirements for a Grade A product) means that the cooked product has the typical flavor and odor of the indicated species of fish and is free from rancidity, bitterness, staleness, and off-flavors and off-odors of any kind.

(2) Reasonably good flavor and odor (minimum requirements of a Grade B product) means that the cooked product is lacking in good flavor and odor but is free from objectionable off-flavors and off-odors of any kind.

§ 263.21 Definitions.

(a) *Examination of sample, frozen state.* (1) Color refers to reasonably uniform color characteristic of the species used. Deviations from normal color include noticeable yellowing and/or rusting of the fish surface.

(2) Dehydration refers to loss of moisture from the fish surfaces during frozen storage. Moderate dehydration is color-masking and can easily be scraped off with a fingernail. Excessive dehydration is deep color-masking and requires a knife or other hard instrument to scrape it off.

(3) Uniformity of size refers to the degree of conformity to the declared size. A deviation is considered to be any deviation from stated length, width or thickness, or from the average dimensions if no dimensions are stated. Only one deviation from each dimension may be assessed. Two readings for length, three readings for width, and four readings for thickness will be measured.

(4) Uniformity of weight refers to the degree of conformity to the weight. Only underweight deviations are assessed.

(5) An acceptable edge angle is an angle formed by two adjoining surfaces whose apex is within ⅜ inch of a carpenter's square placed along the surfaces. For each edge angle, three readings will be made and at least two readings must be acceptable for the whole edge angle to be acceptable. An acceptable corner angle is an angle formed by 3 adjoining surfaces whose apex is within ⅜ inch of the apex of a carpenter's square placed on the edge surfaces. Unacceptable angles fail to meet these criteria.

(6) Improper fill refers to surface and internal air or ice voids, ragged edges, or damage. It is measured as the number of 1-ounce units that would be adversely affected when the block is cut. For this purpose, the 1-ounce unit is considered to be 4 x 1 x ⅝ inch.

(b) *Examination of the product, thawed state.* (1) Blemishes refer to a piece of skin, scale, a blood spot, a fin, a bruise, a black belly lining, a piece of nape membrane or a harmless piece of extraneous material. One "piece of skin" consists of one piece ½ square inch in area; except that for skin patches larger than 1 square inch, an additional instance shall be assessed for each additional ½ square inch in area. "Blood spot" is one of such size and degree as to be considered objectionable. A "piece of black belly lining" is any piece longer than ½ inch. "Fin" is one fin or one identifiable part of a fin. A piece of nape membrane consists of one piece ½ square inch in area or larger. "Scales" are aggregates of one or more scales of such degree as to be considered objectionable. Skin is not to be considered a blemish on Style II block. Blemishes are measured on a 5-pound portion cut from the edge of the fish block and thawed.

(2) "Bones" refers to any potentially harmful bones in the fish block. A potentially harmful bone is one that after being cooked is capable of piercing or hurting the palate. One instance of bones means one bone or group of bones occupying or contacting a circular area of 1 square inch. Bones are measured on the same 5-pound thawed portion cut from the fish block.

TABLE 1—SCHEDULE OF POINT DEDUCTIONS PER SAMPLE UNIT

State	No.	Factors scored	Aspects determining score	Deduct
Frozen	1	Color	Small degree: Moderate yellowing Large degree: Excessive yellowing and/or rusting	4 16
	2	Dehydration	Minor: Moderate dehydration for each 10 percent of surface area affected. Major: Excessive dehydration for each 10 percent of surface area affected.	3 6
	3	Uniformity of size	Minor: Each deviation from declared size in length, width, or thickness ±⅛ to ¼ inch. Major: Each deviation from declared size in length, width, or thickness over ±¼ inch.	3 6
	4	Uniformity of weight	Minor: Any minus deviation from declared weight of more than 1 ounce but not more than 4 ounces. Major: Any minus deviation from declared weight more than 4 ounces.	3 8
	5	Angles	Edge angle—2 out of 3 readings deviating ⅜ inch. Corner angle—each angle deviating ⅜ inch.	2
	6	Improper fill	For each 1 ounce unit cut from the block that would be adversely affected due to air spaces, ice spaces, depressions, ragged edges, damage, or imbedded packaging material.	1
Thawed	7	Blemishes	Each blemish in 5 pounds of fish block	2
	8	Bones	Each instance of bones in 5 pounds of fish block	5
Cooked	9	Texture	Small Degree: Moderately tough, dry, rubbery, or mushy Large Degree: Excessively tough, dry, rubbery, or mushy	5 15

[1] Compliance with the provisions of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act.

(c) *Examination of the cooked product.* (1) Heating in a suitable manner means heating the product in one of two ways, as follows:

(i) Cut three or more portions about 4 by 3 by ½ inches from a frozen block. Wrap them individually or in a single layer in aluminum foil. Place the package portions on a wire rack suspended over boiling water in a covered container. Steam the packaged portions until the product is thoroughly heated, or

(ii) Cut and package the portions as previously described. Place the packaged portions on a flat cookie sheet or shallow flat-bottom pan of sufficient size so that the packages can be evenly spread on the sheet or pan. Place the pan and frozen contents in a properly ventilated oven heated to 400° F. and remove when the product is thoroughly heated.

(2) Texture refers to the condition of the cooked fish flesh. The texture should be firm, slightly resilient, but not tough or rubbery; and should be moist, but not mushy. Deductions for texture will follow the deductions assessed in table 1.

(3) Flavor and odor is evaluated organoleptically as described in § 263.11(b).

(d) *General definitions.* (1) "Demonstrably acceptable" shall mean that the product has been produced commercially and met customer acceptance.

(2) "Adversely affected" shall mean that the unit cut would deviate more than 15 percent plus or minus from 1 ounce.

(3) "Small" (overall assessment) refers to a condition that is noticeable, but is not seriously objectionable.

(4) "Large" (overall assessment) refers to a condition that is not only noticeable, but is seriously objectionable.

(5) "Minor" (measured quantity or area) refers to a defect that affects the appearance or utility of the product or both.

(6) "Major" (measured quantity or area) refers to a defect that seriously affects the appearance or utility of the product or both.

§ 263.25 Tolerances for certification of officially drawn samples.

The sample rates and grades of specific lots shall be certified on the basis of the regulations governing inspection and certification of processed fishery products, processed products thereof, and certain other processed food products.

Second issue. These standards supersede the standards that have been in effect since July 1958.

Note: See Commercial Fisheries Review, August 1964 p. 90.

United States Circuit Court of Appeals

RULING UPHOLDS BREADED SEAFOOD PROCESSOR'S OVERTIME EXEMPTION UNDER FAIR LABOR STANDARDS ACT: A recent Federal Court of Appeals decision in essence shows that the exemption from the overtime requirements of the Federal Wage and Hour Law is applicable to employees hired in the processing and freezing of breaded fish products, crab cakes, and deviled crabs.

On August 19, 1964, the United States Court of Appeals for the Fourth Circuit upheld a breaded seafood processor's overtime exemption under Section 13(b) (4) of the Fair Labor Standards Act (Wirtz v. Chesapeake Bay Frosted Foods Corp., 16 WH Cases 623, August 19, 1964.) The decision was given in an appeal from a July 26, 1963, ruling by the U. S. District Court for the Eastern District of Virginia (Wirtz v. Chesapeake Bay Frosted Foods Corp., 220 F. Supp. 586--E.D. Va. 1963).

The cases involved the U. S. Labor Department's interpretative rulings (29 CFR, Part 784, Sections 784.110 through 784.112) that processors are not entitled to an overtime exemption for employees engaged in processing fishery products consisting of more than 20 percent nonaquatic matter. An injunction sought by the Labor Department against a breaded seafood processor in Newport News, Va., had raised the issue of whether Labor Department's criterion should apply to breaded oysters, breaded scallops, breaded shrimp, breaded fish sticks and portions, crab cakes, and deviled crabs. (Practically all breaded frozen seafoods must, in order to be marketable, contain more than 20 percent of breading materials.)

The Federal District Court in its 1963 opinion held that the Labor Department's interpretation as applied in this case was invalid. The District Court denied the injunction and said that the section 13(b) (4) exemption in the Fair Labor Standards Act "plainly encompasses the processing of living organisms which are taken from the sea. And so long as the processes involved are directed primarily at those sea organisms (though nonaquatic matter may be incidentally added), the processes should be within the statutory exemption." The court said that the percentage of nonaquatic ingredients should be only one relevant factor to be considered.

The District Court's opinion went on to say that it is relevant whether the products retain a consistent identity from the time they arrive at the plant until they are packaged for market. In this case, the court said, "the oysters arrive as oysters and leave as oysters regardless of the addition of nonaquatic

material." The same principle was held to be applicable to the other products processed by the packer, although the court noted that it was a closer question with respect to the crab cakes and deviled crabs which undergo more extensive preparation and change of form.

A second reason cited by the District Court for invalidating the Labor Department's regulation as applied to those products was that the regulation did not carry out the Congressional intent which "was to make allowances for an industry which is seasonal in nature and which deals with highly perishable commodities, thus demanding long hours as unpredictable as the run of the fish and offering no work for long slack periods; and therefore manifestly not suited to the conventional 8-hour day and 40 hour-week."

The opinion of the District Court was appealed, and on August 19, 1964, the United States Court of Appeals for the Fourth Circuit in Richmond upheld the ruling of the District Court.

Before the Court of Appeals, the Labor Department took the position that even if the preparation of breaded products from perishable and fresh aquatic products was covered by the overtime exemption, the exemption should not be applicable when the breading and processing operation is carried out on prefrozen small shrimp and fish. Such processing did not, the Labor Department contended, fall within the Congressional intent to provide an exemption for processing of perishable commodities.

The Court of Appeals held that the statutory exemption of section 13(b) (4) was not phrased in such narrow terms as to apply solely to the processing of a raw fresh product. The court noted that the exemption applied not only to processing but also to storing, packing for shipment, and distributing frozen seafood. The court thus found no basis in the statute for a distinction between those employees who process and handle previously frozen fish and small shrimp and those other employees of the same employer who handle exclusively a much larger volume of previously unfrozen products of the sea.

It is not known whether the Department of Labor will seek to obtain Supreme Court review of the Court of Appeals decision upholding the District Court invalidation of the "20-percent nonaquatic matter rule."

Although the case involved only frozen products, the Labor Department's interpretative bulletin in issue is applicable alike to frozen and canned aquatic products.

Note: See Commercial Fisheries Review, September 1963 p. 110, March 1962 p. 62.

Eighty-Eighth Congress

(Second Session)

Public bills and resolutions which may directly or indirectly affect the fisheries and allied industries are reported upon. Introduction, referral to committees pertinent legislative actions by the House and Senate, as well as signature into law or other final disposition are covered.

ADJOURNMENT OF 88th CONGRESS: The House on Oct. 2, 1964, and the Senate on Oct. 3, 1964, adopted H. Con. Res. 371, providing for sine die adjournment of the 2nd session of the 88th Congress on Oct. 3.

ASSEMBLING OF 89th CONGRESS: The House on Oct. 2, 1964, and the Senate on Oct. 3, 1964, adopted H.J. Res. 1192, providing for the convening of the 89th Congress on January 4, 1965.

ALASKA DISASTER RELIEF: On September 30, 1964, Senator Bartlett spoke in the Senate, reviewing the accomplishments thus far attained in Alaska since the earthquake disaster of last March. In his remarks he inserted portions of the reports from the Federal Reconstruction and Development Commission of Alaska and the Office of Emergency Planning (Congressional Record, pp. 22487-22495).

ALASKA EARTHQUAKE DAMAGE: On September 16, 1964, Congressman Rivers spoke in the House and inserted in the Appendix of that day's Congressional Record (pp. A4709-A4711), the text of a speech by Alaska's Governor to the convention of the Alaska Association of Realtors at Anchorage on September 10, 1964. The speech outlined accomplishments thus far attained in Alaska to overcome the earthquake disaster of March 1964.

ALASKA SALMON: Senator Bartlett on September 29, 1964, spoke in the Senate and inserted in that day's Congressional Record (pp. 22304-22305) an article by the Director of the Fisheries Research Institute of the University of Washington College of Fisheries which

appeared in the September 1964 issue of the Pacific Fisherman. The article titled "Prospects for Alaska Salmon: Let Me Be an Optimist" discusses salmon resources, most of the salmon problems, and what can be done in view of the future.

COMMERCIAL FISHERIES RESOURCES SURVEY: S. Rept. 1469, Survey of Marine and Fresh-Water Commercial Fisheries (August 18, 1964, report from the Committee on Commerce, United States Senate, 88th Congress, 2nd Session, to accompany S.J. Res. 174), 17 pp., printed. The Committee recommended passage (with amendments) of S.J. Res. 174, to authorize and direct the Bureau of Commercial Fisheries to conduct a survey of the marine and fresh-water commercial fishery resources of the United States, its territories, and possessions. The bill would obtain, through a comprehensive survey by the Bureau of Commercial Fisheries, information and data on marine and fresh-water resources, existing and potential, which will enable the commercial fishery industries of the United States to meet the need for their distinctive protein-rich food products, for byproducts required by expanding industrial uses, and, in the event of national emergency, for such vessels and manpower as may be necessary or useful to our maritime defense. Such a survey also is needed so the Congress may legislate properly and wisely on matters pertaining to the development, utilization, and conservation of these valuable resources, many of which presently are threatened with serious depletion. Contains the purpose, historical background, and an analysis of the resolution; also agency comments.

FISHING INDUSTRY PROBLEMS: On September 24, 1964, Senator Bartlett spoke in the Senate and inserted in that day's Congressional Record (pp. 22092-22093) an address by the director of the fishery products program, National Canners Association, delivered at the 23rd Annual Meeting of the Atlantic States Marine Fisheries Commission. The address discussed the problems facing the American fishing industry.

FISHERY LEGISLATION: On October 2, 1964, Senator Bartlett spoke in the Senate inserting in that day's Congressional Record (p. 22748) a speech delivered at the Atlantic States Marine Fisheries Commission on September 22 by H. E. Crowther, Deputy Director, Bureau of Commercial Fisheries. The speech was titled "Significant Fishery Legislation of the 88th Congress."

FOOD-FOR-PEACE, AND FISH: On September 14, 1964, Senate resumed consideration of H.R. 11380, to amend further the Foreign Assistance Act of 1961, as amended, and for other purposes. Senate on September 17, 1964, debated H.R. 11380. On September 24, 1964, Senate passed, with amendments, H.R. 11380. Senate insisted on its amendments, asked for a conference with House, and appointed conferees. Authorizes appropriations of $50 million for purchase of domestically-produced beef, poultry, and other meats, and meat products, dairy products, rice, and other high-protein foods which are in adequate supply in the United States for donation to school lunch and similar programs in foreign countries eligible for assistance under the bill. Senator McGovern stated that "other high protein foods" would include fish and fish products.

On September 28, 1964, the Senate received the President's communication transmitting supplemental material to be included with the 20th semiannual report on activities carried on under P.L. 480, 83rd Congress, outlining operations under the Act for the period of January 1-June 30, 1964. Referred to the Senate Committee on Agriculture and Forestry.

On September 30, 1964, objection was made in the House to a unanimous-consent request to send to conference H.R. 11380, fiscal year 1965 authorizations for the foreign aid program. The Committee on Rules reported (Rept. 1922) H.Res. 895, providing for sending to conference H.R. 11380.

On October 1, 1964, the House by a voice vote adopted H.Res. 895, providing for sending to conference H.R. 11380, fiscal 1965 authorizations for the foreign aid program. On same day the conference report (Rept. 1925) was filed. H.R. 11380 was signed by the President October 7, 1964 (P.L. 88-633). As approved, the bill does not include the Senate amendment authorizing an additional appropriation of $50,000,000 to be used to donate domestically-produced meat and other protein foods to school lunch programs abroad.

On September 16-17, 1964, the Senate and House met in executive session to resolve the differences between the Senate- and House-passed versions of S. 2687, extending for 2 years the Agricultural Trade Development and Assistance Act of 1954 (P.L. 480) but did not reach a final agreement.

On September 22, 1964, conferees filed a conference report (H. Rept. 1897) on S. 2687.

H. Rept. 1897, Public Law 480 Extension (September 22, 1964, report from the Committee on Conference, House of Representatives, 88th Congress, 2nd Session, to accompany S. 2687), 8 pp., printed. Contains Committee recommendations on an amendment to S. 2687, to extend the Agricultural Trade Development and Assistance Act of 1954, as amended, and for other purposes; also a statement of managers on the part of the House. The Conference Report extended the Authorization for Titles I and II of the Act (P.L. 480) for a 2-year period, and approved an authorization of $2.7 billion plus carryover of unused funds from past years, for Title I activities for the 2-year period. The House-passed version of the bill had authorized a 3-year extension for Titles I and II, with an authorization of $4 billion plus carryover for Title I programs for the 3-year period. Fishery products are included under Title I.

On Sept. 23, 1964, the House adopted the conference report on S. 2687, and sent the legislation to the Senate. The Senate debated the conference report and agreed to vote on September 24, 1964, on a motion to refer the conference report to the Committee on Foreign Relations for hearings and study. Senate on September 24, 1964, adopted conference report on S. 2687, clearing bill for the President's signature. On October 8, 1964, S. 2687 was signed by the President (P.L. 88-638).

On October 3, 1964, Senator McGovern spoke in the Senate stating that Peace Director Richard W. Reuter told the American Soybean Association recently that "food for peace is coming closer to a moment of truth" when we must decide if we are going to produce foodstuffs for foreign assistance programs or terminate the programs because our surpluses have been liquidated. The address ("Public Law 480: Surplus Disposal Is Not Enough") was ordered printed in the "Congressional Record" of October 15, 1964 (pp. A5330-5331).

HEALTH, EDUCATION, AND WELFARE APPROPRIATIONS, FY 1965: On September 3, 1964, House agreed to conference report, and on same day Senate

adopted conference report (H. Rept. 1880), and concurred in House amendments to Senate amendments on H.R. 10809, fiscal year 1965 appropriations for the Departments of Labor and Health, Education, and Welfare, and related agencies. Bill was cleared for the President's signature. H.R. 10809 signed by President on September 19, 1964 (P.L. 88-605). Under Department of Health, Education, and Welfare provides funds for water supply and pollution control; for special investigation of water pollution in lower Mississippi where large fish kills have occurred; the Public Health Service's two new laboratories for shellfish sanitation measures; shellfish sanitation and certification; the Food and Drug Administration's botulism research.

NATURAL RESOURCES DEPARTMENT: On October 2, 1964, Senator Morse spoke in the Senate proposing that all Federal programs primarily intended for the management of the Nation's natural resources be brought together in a single Department of Natural Resources.

NORTH PACIFIC FISHERIES CONVENTION: It was announced on September 14, 1964, that the President pro tempore appointed Senators Bartlett and Fong to attend the third round in a series of talks between Canada, Japan, and the United States on the International Convention for the High Seas Fisheries of the North Pacific Ocean, which opened in Ottawa, September 9, 1964.

PASSAMAQUODDY TIDAL POWER PROJECT: Passamaquoddy-St. John (Hearing before a Subcommittee of the Committee on Public Works, United States Senate, 88th Congress, 2nd Session, on S. 2573), 136 pp., printed Contains hearing held August 12, 1964, on S. 2573, to authorize the International Passamaquoddy Tidal Power Project, including Hydroelectric Power Development of the Upper St. John River, and for other purposes. The project envisions the use of the power potential of the tides of Passamaquoddy Bay and the flows of the Saint John River in the State of Maine and the Province of New Brunswick for promoting economic development and providing flood control. Hearing was limited to consideration of the technical studies completed by the Department of the Interior and the U. S. Corps of Engineers. The presiding Senator pointed out that in the next Congress, it is planned to expand the hearings for comments by other Government departments and to hear public witnesses. Contains statements from the Secretary of the Interior and Secretary of the Army; the text of the bill; the supplemental report of the Passamaquoddy-Saint John River Study Committee to the Secretary of the Interior, dated August 3, 1964, together with introductory remarks of the Department of the Interior.

PESTICIDES: On September 14, 1964, Congressman Cunningham spoke in the House and inserted in the Appendix of that day's Congressional Record (pp. A4687-A4688) an article from the July issue of the publication Farm Chemicals entitled "Pesticides and Scare Campaigns." The article traces the various campaigns against pesticides dating back to 1900.

RADIATON PRESERVATION OF FISH: On September 22, 1964, Senator Mundt spoke in the Senate and inserted in that day's Congressional Record (pp. 21787-21791) an address by the director of the Donner Laboratory and Donner Pavilion at the University of California, entitled "Atomic Energy, Science, and Education." In the address it was mentioned that one of the current Atomic Energy Commission studies is concerned with the radiation preservation of fish.

Senator Saltonstall on September 28, 1964, spoke in the Senate and inserted in that day's Congressional Record (p. 2257) an article entitled "Eerie Blue Lights--A Revolution in Seafoods" from the Boston Globe, which commented on the dedication of the Atomic Energy Commission's new experimental laboratory for the radiation of marine products in Gloucester, Mass. The laboratory is to experiment with the preservation of fish and shellfish products.

SALMON CANNING: On September 28, 1964, Senator Bartlett spoke in the Senate concerning salmon canning and inserted in that day's Congressional Record (pp. 22250-22252) an article from the September 1964 Pacific Fisherman titled "One Hundred Years of Growth in Salmon Canning."

SUPPLEMENTAL APPROPRIATIONS, FY 1965: Supplemental Appropriation Bill, 1965 (Hearings before Subcommittee of the Committee on Appropriations, House of Representatives, 88th Congress, 2nd Session). Part 1, 506 pp., printed; Part 2, 181 pp., printed. Contains hearings held August 10-17, 1964, on supplemental appropriations for fiscal year ending June 30, 1965, and for other purposes for various agencies. Includes testimony, statements, communications, and reports from various Federal agencies and their officials and Congressmen. Under the Interior Department are included supplemental funds for the Fish and Wildlife Service's two Bureaus--Commercial Fisheries, and Sport Fisheries and Wildlife. For the Bureau of Commercial Fisheries an increase of $25,000 in order to meet the increased administrative expenses for loan program activity due to the Alaska earthquake and tidal wave in March 1964. Enactment of Commercial Fisheries Research and Development Act of 1964 (P.L. 88-309) authorizes the Secretary to make loans from available funds to commercial fishermen for chartering vessels until June 30, 1966. This will provide immediate relief pending reconstruction of the Alaskan commercial fishing fleet. Presently available for administrative expenses of the Fisheries Loan Fund in 1965 is $302,000, an increase of $25,000. Contains statements, budget summaries, and estimates. Also, for the Bureau of Sport Fisheries and Wildlife an increase of $1,050,000 (presently available for 1965 is $33,810,000), $900,000 of which is for the administration of wildlife resources activity, and $150,000 is for pesticide research activity (to review referrals from the Department of Agriculture of applications for label registration of chemicals under the Federal Insecticide, Fungicide and Rodenticide Act; review will determine the actual or potential hazards to fish and wildlife from the proposed use of a chemical; and to assist and advise the Food and Drug Administration in establishing tolerances).

The Supplemental Appropriations Bill, 1965 (Hearings before the Committee on Appropriations, United States Senate, 88th Congress, 2nd Session on H.R. 12633), 822 pp., printed. Contains hearings held August 14, 1964-September 24, 1964, on H.R. 12633, an act making appropriations for the fiscal year ending June 30, 1965, and for other purposes. Includes text of the bill, testimony, statements, communications, and reports from various Federal agencies and their officials, as well as Representatives and Senators, and State and other officials. Under the Department of the Interior there are additional funds for the two Bureaus of the U. S. Fish and Wildlife Service. For the Bureau of Commercial Fisheries there is an increase of $25,000 in the limitation of $277,000 for fiscal year 1965 on administrative expenses for the fisheries vessel loan fund. The additional amount is needed because of the additional

loan workload raised by the March 1964 earthquake and tidal wave. In addition, included was a request for $3 million for a fishing vessel construction differential subsidy program. For the Bureau of Sport Fisheries and Wildlife there is a supplemental appropriation of $1,050,000 of which $900,000 is to replace a permanent appropriation. Also $700,000 in construction funds for rehabilitation of facilities which have been damaged by floods.

On September 17, 1964, H.R. 12633 was reported to the House (H. Rept. 1891).

H. Rept. 1891, Supplemental Appropriation Bill, 1965 (September 17, 1964, report from the Committee on Appropriations, House of Representatives, 88th Congress, 2nd Session, to accompany H.R. 12633), 33 pp., printed. To make supplemental appropriations for fiscal year 1965 for various departments and agencies.

On September 22, 1964, House passed H.R. 12633 by a record vote of 208 yeas to 103 nays.

The Senate Committee on Appropriations on September 22, 1964, held hearings on H.R. 12633. It received testimony from the Deputy Director of the U. S. Bureau of Commercial Fisheries on funds for the fishing vessel construction subsidy program under P.L. 88-498. On September 24, 1964, Senate Committee on Appropriations concluded its hearings on H.R. 12633.

On September 29, 1964, the Senate Committee on Appropriations reported (S. Rept. 1604), with amendments, H.R. 12633.

SUPPLEMENTAL APPROPRIATIONS, FY 1965: S. Rept. 1604, Supplemental Appropriation Bill, 1965 (September 29, 1964, report from the Committee on Appropriations, United States Senate, 88th Congress, 2nd Session, to accompany H.R. 12633), 47 pp., printed. The committee recommended supplemental appropriations for the fiscal year ending June 30, 1965, and for other purposes. Bill was reported to the Senate with amendments. Contains the Committee's recommendations for supplemental fund for various Federal agencies. Under the Department of the Interior there are additional funds for the two Bureaus of the U. S. Fish and Wildlife Service: Commercial Fisheries and Sport Fisheries and Wildlife.

On October 1, 1964, the Senate passed H.R. 12633, making supplemental appropriations for fiscal year 1965. The Senate insisted on its amendments, asked for a conference with the House, and appointed conferees. The House agreed to the conference and appointed conferees. On October 2, 1964, the Conference Report (H. Rept. 1928) on H.R. 12633 was filed and it was adopted by the House and Senate.

SUPPLEMENTAL APPROPRIATIONS, FY 1965: H. Rept. 1928, Supplemental Appropriation Bill, 1965 (October 2, 1964, report from the Committee of Conference House of Representatives, 88th Congress, 2nd Session, to accompany H.R. 12633), 10 pp., printed. The Committee recommended that the Senate recede from certain of its amendments and that the House recede from its disagreements to certain amendments of the Senate, and agreed to the same.

The Senate cleared the bill for the President on October 3, 1964, by concurring in House amendment (as modified by House action on same day when it receded and concurred with an amendment) to a Senate amendment.

H.R. 12633 was signed by the President October 7, 1964 (P.L. 88-635). Included are supplemental funds for the Fish and Wildlife Service's two Bureaus--Commercial Fisheries and Sport Fisheries and Wildlife. For the Bureau of Commercial Fisheries there is $25,000 for increased administrative expenses for vessel loan program activity due to the Alaska earthquake and tidal wave in March 1964; and $2,500,000 for the fishing vessel construction subsidy program under P.L 88-498.

TRADE AGREEMENTS PROGRAM: The Senate and House on September 23, 1964, received a message (H. Doc. 366) from the President transmitting the eighth annual report on the operation of the Trade Agreement Program. Referred to the Senate Committee on Finance and the House Committee on Ways and Means.

TERRITORIAL WATERS OF THE UNITED STATES: On October 1, 1964, Congressman Pelly spoke in the House concerning the need for the United States to extend its fishing limits to 12 miles.

WATER POLLUTION CONTROL ADMINISTRATION: H. Rept. 1885, Federal Water Pollution Control Act Amendments (September 4, 1964, report from the Committee on Public Works, House of Representatives, 88th Congress, 2nd Session, to accompany S. 649), 29 pp., printed. The Committee recommended passage (with amendments) of S. 649, to amend the Federal Water Pollution Control Act, as amended, to establish the Federal Water Pollution Control Administration, to provide grants for research and development, to increase grants for construction of municipal sewage treatment works, to authorize the issuance of regulations to aid in preventing, controlling, and abating pollution of interstate waters, and for other purposes. Contains the purpose, general statement, and major provisions of the bill; views of the Committee; changes in existing law; text of the bill; minority views; and supplemental views of Representatives Clausen and James.

WATER RESOURCES COUNCIL: H. Rept. 1877, Water Resources Planning Act (September 2, 1964, report from the Committee on Interior and Insular Affairs, House of Representatives, 88th Congress, 2nd Session, to accompany S. 1111), 34 pp., printed. The Committee recommended passage to provide for the optimum development of the Nation's natural resources through the coordinated planning of water and related land resources, through the establishment of a water resources council and river basin commission, and by providing financial assistance to the States in order to increase State participation in such planning. Contains the text, purpose, need, section-by-section analysis, and cost of the bill. Also, includes communications from various departments regarding the bill.

RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE OFFICE OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON, D. C. 20402. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES.
FL - FISHERY LEAFLETS.
MNL - REPRINTS OF REPORTS ON FOREIGN FISHERIES.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.
SSR.- FISH. - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).

Number	Title
CFS-3540	- Frozen Fishery Products, June 1964, 8 pp.
CFS-3551	- Massachusetts Landings, January 1964, 6 pp.
CFS-3552	- Louisiana Landings, 1963 Annual Summary, 8 pp.
CFS-3553	- Shrimp Landings, January 1964, 5 pp.
CFS-3555	- Shrimp Landings, February 1964, 5 pp.
CFS-3557	- New York Landings, May 1964, 5 pp.
CFS-3567	- Virginia Landings, April 1964, 4 pp.
CFS-3568	- California Landings, May 1964, 4 pp.
CFS-3572	- Rhode Island Landings, March 1964, 3 pp.
CFS-3573	- Fish Meal and Oil, June 1964, 2 pp.
CFS-3574	- Middle Atlantic Fisheries, 1963 Annual Summary, 6 pp.
CFS-3576	- New Jersey Landings, June 1964, 3 pp.

SL-16 - Wholesale Dealers in Fishery Products, Florida, 1963, 16 pp. (revised).

Sep. No. 710 - Comparison of Salmon Catches in Monofilament and Multifilament Gill Nets--Part II.

Sep. No. 711 - Weights and Measures Activities in the USDI Fishery Products Standards and Inspection Programs.

FL-336 - Commercial Fisheries Outlook, April-June 1964, 4 pp.

FL-567 - Caviar and Other Fish Roe Products, by Norman D. Jarvis, 10 pp., May 1964. Covers the steps involved in processing grain caviar in barrels; salted and smoked cod roe; dry-salted, and air-dried and pressed mullet roe; salmon caviar; salted and air-dried tuna roe; and tuna caviar.

SSR-Fish. No. 464 - Fish Schools and Bird Flocks in the Central Pacific Ocean, by Kenneth D. Waldron, 25 pp., illus., March 1964.

SSR-Fish. No. 476 - Herring Fishery of the U. S. Passamaquoddy Region, by Leslie W. Scattergood and Lewis J. Lozier, 25 pp., illus., March 1964.

SSR-Fish. No. 481 - Air and Water Temperatures and Stream Flow Data, Convict Creek, Mono County, California, 1950 to 1962, by Harry D. Kennedy, 50 pp., April 1964.

Extent of Acid Mine Pollution in the United States Affecting Fish and Wildlife, by Edward C. Kinney, Circular 191, 32 pp., illus., processed, June 1964.

THE FOLLOWING MARKET NEWS LEAFLETS ARE AVAILABLE FROM THE FISHERY MARKET NEWS SERVICE, U. S. BUREAU OF COMMERCIAL FISHERIES, RM. 510, 1815 N. FORT MYER DR., ARLINGTON, VA. 22209.

Number	Title
MNL-11	- Fishing Industry in Spain, 1963, 8 pp.
MNL-26	- Taiwan Fisheries in 1963, 21 pp.,
MNL-40	- Moroccan Fishing Industry, 1962/63, 19 pp.

THE FOLLOWING PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

(Baltimore) Monthly Summary--Fishery Products, January, February, March, and April, 1964, 8 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 103 S. Gay St., Baltimore, Md. 21202.) Receipts of fresh- and salt-water fish and shellfish at Baltimore by species and by states and provinces; total receipts by species and comparisons with previous periods; and wholesale prices for fresh fishery products on the Baltimore market; for the months indicated.

California Fishery Market News Monthly Summary, Part I - Fishery Products Production and Market Data, July 1964, 15 pp. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.) California cannery receipts of tuna and tunalike fish and other species used for canning; pack of canned tuna, tunalike fish, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California and Arizona imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; prices for fish meal, oil, and solubles; for the month indicated.

Fishery and Oceanography Translations, no. 1, June 1964, 41 pp., processed. (Branch of Reports, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington, D. C. 20240.) The first of a new series established to provide information about translations of fishery and oceanography literature. Future issues of this periodical will include translated Russian current titles, journal tables of contents, and short translations. In July 1963 the Bureau of Commercial Fisheries, Branch of Reports, established a Translation Program to disseminate information about Russian scientific literature, to

produce Russian translations for scientists, and to act as a clearinghouse for information on translations from all languages. The Translation Program maintains a bibliographic file begun in 1959 and containing records of nearly 5,000 completed translations and more than 300 translations in progress. In addition, approximately 1,200 translations are available on interlibrary loan. This issue contains an article, "Russian serials of interest to aquatic biologists, fishery technologists, and oceanographers," by Kristian Fr. Wiborg and Paul T. Macy; and a list, "Translations of fishery and oceanography literature, authors A-F," compiled by Paul T. Macy.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland, July 1964, 4 pp. (Market News Service, U.S. Fish and Wildlife Service, 18 S. King St., Hampton, Va. 23369.) Landings of food fish and shellfish and production of crab meat and shucked oysters for the Virginia areas of Hampton Roads, Chincoteague, Lower Northern Neck, and Lower Eastern Shore; the Maryland areas of Crisfield, Cambridge, and Ocean City; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data on fishery products and shrimp production; for the month indicated.

New England Fisheries--Monthly Summary, July 1964, 22 pp. (Market News Service, U.S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston, Mass. 02210.) Review of the principal New England fishery ports. Presents data on fishery landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold-storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Provincetown, and Woods Hole), Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and Boston Fish Pier and Atlantic Avenue fishery landings and ex-vessel prices by species; for the month indicated.

North Pacific Oceanography, February-March 1963, by W. James Ingraham, Jr., Data Report No. 3, 1 microfiche card, October 24, 1963. (Branch of Reports, Bureau of Commercial Fisheries, U.S. Department of the Interior, Washington, D. C. 20240.)

Oceanographic Observations, 1961, East Coast of the United States, by Joseph Chase, Data Report No. 1, 6 microfiche cards, illus., September 25, 1963, distribution limited. (Branch of Reports, Bureau of Commercial Fisheries, U.S. Department of the Interior, Washington, D. C. 20240.) This is the first in the new Data Report Series, which comprises reports that include compilations of unanalyzed data collected during oceanographic, limnological, or biological investigations. Each report will be serially numbered, issued separately, and paged separately. The reports will be distributed on 3- by 5-inch microfiche cards. Hard (full-size) copy will be available for purchase; however, the microfiches will be free to a restricted mailing list of laboratories, libraries, state fishery agencies, research institutions, and research scientists. Reports in this new series can be issued more quickly and cheaply and will occupy less storage space than the Special Scientific Reports--Fisheries in which such data were previously published.

Preliminary Results of the Systematic Screening of 4,306 Compounds as "Red-Tide" Toxicants, by Kenneth T. Marvin and Raphael R. Proctor, Jr., Data Report No. 2, 3 microfiche cards, February 10, 1964. (Branch of Reports, Bureau of Commercial Fisheries, U.S. Department of the Interior, Washington, D. C. 20240.)

Production of Fishery Products in Selected Areas of Maryland, Virginia, and North Carolina, 1963, by William N. Kelly, 33 pp., June 1964. (Market News Service, U.S. Fish and Wildlife Service, P.O. Box 447, Hampton, Va. 23369.) A summary of commercial landings of fish and shellfish and the production of crab meat and shucked oysters as reported by producers and wholesalers from selected principal fishing localities of Virginia, Maryland, and North Carolina. Discusses landings in the Hampton Roads, Lower Northern Neck, Lower Eastern Shore, and Chincoteague areas of Virginia; Ocean City, Cambridge, and Crisfield, Maryland; and Morehead City, North Carolina. Also covers landings by major species of finfish--scup, alewife, sea bass, tuna, fluke, gray sea trout, striped bass, croaker, butterfish, spot, shad, swordfish, and menhaden. Includes statistical tables on catches of the major finfish species, shrimp, and other shellfish; and landings by localities. Swordfish was landed in the area for the first time, with 14 long-line vessels participating in this fishery.

Receipts and Prices of Fresh and Frozen Fishery Products at Chicago, 1963, by C. E. Cope, 58 pp., illus., September 1964. (Fishery Market News Service, U.S. Fish and Wildlife Service, Rm. 704, 610 S. Canal St., Chicago, Ill. 60607.) Summarizes fishery products receipts and prices at Chicago during 1963. Notable events were the establishment of shrimp futures trading on the Chicago Mercantile Exchange; initiation of air shipments of Alaskan fresh-water fish to Chicago; and the perfecting of a yellow perch filleting machine. Statistical tables include data on receipts of fish and shellfish at Chicago wholesale market by species, states, and provinces, and by months; and wholesale market price ranges by months for fresh-water fish, frozen fillets, and other frozen fish and shellfish.

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, August 1964, 9 pp. (Market News Service, U.S. Fish and Wildlife Service, 706 Federal Office Bldg., 909 First Ave., Seattle 4, Wash. 98104.) Includes Seattle's landings by the halibut and salmon fleets reported through the exchanges; landings of halibut reported by the International Pacific Halibut Commission; landings of otter-trawl vessels as reported by the Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and non-scheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington customs district; for the month indicated.

THE FOLLOWING SERVICE PUBLICATION IS FOR SALE AND IS AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. 20402.

Sea-Water Systems for Experimental Aquariums, edited by John R. Clark and Roberta L. Clark, Re-

search Report 63, 192 pp., printed, 1964, $1.25. Includes 27 papers dealing with different sea-water systems in a number of Federal, state, and foreign marine laboratories. Should be of value to all who are concerned with fresh-water as well as sea-water aquarium systems.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ACCLIMATIZATION:

"Akklimatiizatsiya ryb vo vnutrennik vodoemakh Latviiskoi SSSR" (Acclimatization of fishes in the inland waters of the Latvian SSSR), by G. P. Andrushaitis, article, Akklimatizatsia Zhivotnykh v SSSR, pp. 212-213, printed in Russian, 1963. Akademiia Nauk Kazakhskoi SSSR, Alma-Ata, U.S.S.R.

"Biologicheskoe obosnovanie i perspektivy akklimatizatsii vesennenerestuyushchego siga v vazhneishikh vodokhranilishchakh SSSR" (Biological basis and prospects for the acclimatization of spring-spawning whitefish in the more important reservoirs of the USSR), by V. I. Anpilova, article, Akklimatizatsia Zhivotnykh v SSSR, pp. 214-216, printed in Russian, 1963. Akademiia Nauk Kazakhskoi SSSR, Alma-Ata, U.S.S.R.

ALGAE:

"Alginic acid," by Louis Lefur, article, Chemical Abstracts, vol. 58, March 18, 1963, 5458a, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

"Developing an unconventional food--algae--by continuous culture under high light intensity," by Robert O. Matthern and Robert B. Koch, article, Food Technology, vol. 18, May 1964, pp. 59-65, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

AMINO ACIDS:

"Amino acid composition of defatted fish flour from oil sardine (Clupea longiceps)," by S. B. Kadkol and N. L. Lahiri, article, Chemical Abstracts, vol. 58, February 4, 1963, 2781a, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

"Seasonal influences on the free amino acids in fish muscle and their importance for quality," by F. Bramstedt, article, Zeitschrift fur Ernahrungswissenschaft, supplement 3, 1963, p. 51, printed in German. Journal of Nutritional Science, Holzhofallee 35, Darmstadt, Germany.

ANCHOVY:

"The food and feeding habits of the anchoveta, Cetengraulis mysticetus," in the Gulf of Panama, by William H. Bayliff, article, Inter-American Tropical Tuna Commission Bulletin, vol. 7, no. 6, 1963, pp. 456-459, printed in Spanish and English. Inter-American Tropical Tuna Commission, La Jolla, Calif.

"Nekotorye sravnitel'nye dannye o razmnozhenii anchousa Engraulis encrasicholus L." (Some comparative data on the reproduction of the anchovy Engraulis encrasicholus L.), by T. V. Dekhnik, article, Voprosy Ikhtiologii, vol. 3, no. 1, 1963, pp. 144-151, illus., printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U.S.S.R.

ANIMAL NUTRITION:

"Microbiological evaluation of protein quality with Tetrahymena pyriforms W. I--Characteristics of growth of the organisms and determination of relative nutritive values of intact proteins," by W. R. Fernell and G. D. Rosen, article, British Journal of Nutrition, vol. 10, 1956, pp. 143-155, illus., printed. Cambridge University Press, 32 E. 57th St., New York, N. Y. 10022.

ANTIBIOTICS:

"Test on the storage of white fish in ice with added aureomycin," by F. Soudan, J. R. Crepey, and M. Dubost, article, Revue des Travaux, Institut Scientifique et Technique des Pêches Maritimes, vol. 27, no. 2, June 1963, pp. 211-220, illus., printed in French. Institut Scientifique et Technique des Pêches Maritimes, 59 Ave. Raymond Poincaré, Paris XVI, France.

ARGENTINA:

"Numerosas adhesiones recibe el Primer Congreso de Promocion Pesquera Bonaerense a Realizarse en el mes de Mayo en la ciudad de Mar del Plata" (Many participants admitted to the First Congress for the Promotion of Fisheries in Buenos Aires Province, to take place in the month of May in the city of Mar del Plata), article, Asuntos Agrarios, vol. 11, no. 128, April 1964, p. 3, printed in Spanish. Departamento de Publicaciones, Avda. 51, No. 774, La Plata, Argentina.

"Piscicultura del pejerrey--Dependencias de la Estacion Hidrobiologica de Chascomus" (Pond culture of the pejerrey--Branch of the Hydrobiological Station at Chascomus), by Fernando C. Ramirez and Haydee A. Macioci, article, Asuntos Agrarios, vol. 11, no. 129, May 1964, p. 5, illus., printed in Spanish. Departamento de Publicaciones, Avda. 51, No. 774, La Plata, Argentina.

"Piscicultura del pejerrey. IV--Expedicion y siembra de alevinos" (Pond culture of the pejerrey. IV--Field trip and planting of fingerlings), by Fernando C. Ramirez and Haydee A. Macioci, article, Asuntos Agrarios, vol. 11, no. 128, April 1964, p. 5, illus., printed in Spanish. Departamento de Publicaciones, Avda. 51, No. 774, La Plata, Argentina.

"El Primer Congreso de Promocion Pesquera Bonaerense establecio las bases para el mejor aprovechamiento de nuestra riqueza icticola" (The First Congress for the Promotion of Fisheries in Buenos Aires Province established the necessary bases for the better development of our ichthiological riches), article, Asuntos Agrarios, vol. 11, no. 129, May 1964, pp. 1, 8-10, illus., printed in Spanish. Departamento de Publicaciones, Avda. 51, No. 774, La Plata, Argentina.

BELGIUM:

Officiele Lijst der Belgische Vissersvaartuigen, 1964 (Official List of Belgian Fishing Vessels, 1964), 75 pp., printed in Flemish, 1964. Ministerie van Verkeersweezn, en van Post, Telegraaf en Telfoon, Brussels, Belgium.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

BUFFALOFISH:

Wholesale Market Demand for Buffalofish, by Marsha A. Walters, 72 pp., processed, September 1961. University of Arkansas, College of Business Administration, Industrial Research and Extension Center, Fayetteville, Ark.

BYPRODUCTS:

"Fish for meal and oil. Part 2--South Africa," by J. A. Lovern, article, News Summary, no. 14, May 1964, pp. 14-16, processed in English with French, German, and Spanish summaries, limited distribution. International Association of Fish Meal Manufacturers, 70 Wigmore St., London W1, England. The main fish species used for meal and oil manufacture in South Africa are the pilchard (Sardinops ocellata) and the maasbanker or horse mackerel (Trachurus trachurus). The oil content shows a similar range, with commercial yields ranging from about 3 gallons to over 20 gallons per short ton, with an average of about 11. Pilchard oil is more unsaturated than maasbanker oil, the respective iodine values being 172-203 and 142-164.

CANADA:

Fisheries Statistics, Nova Scotia, 1962, 46 pp., illus., printed in French and English, July 1964, 75 Canadian cents. Queen's Printer and Controller of Stationery, Ottawa, Canada. Consists of tables showing quantity and value of landings in Nova Scotia during 1950-1962 by species; value of fishery products, 1950-1962; classification of fishing vessels in Nova Scotia by weight, length, fisheries districts, and type of gear used, 1961/1962; new capital investment in the Nova Scotian fishery, 1962; number of fishermen and persons engaged in the major fisheries, 1961/1962.

CARP:

"Fish eat weeds to aid power plant operation," article, Science News Letter, vol. 86, no. 9, August 29, 1964, p. 139, printed, single copy 15 cents. Science Service, 1719 N St. NW., Washington, D. C. 20036.

CHARTS:

U.S. Lake Survey Catalog of Charts of the Great Lakes and Outflow Rivers (also Lake Champlain, New York State Barge Canal System, Minnesota-Ontario Border Lakes), Edition of 1964/1965, 25 pp., illus., printed, 1964. Technical Publications Branch, U. S. Army Engineer District, Lake Survey, Corps of Engineers, 630 Federal Bldg., Detroit 26, Mich. Charts listed in this catalog were prepared by the U. S. Lake Survey, whose mission is the preparation and publication of navigation charts and pilots covering the Great Lakes, Lake Champlain, New York State Barge Canal System, and the Minnesota-Ontario Border Lakes; the study of matters affecting the hydrology of the Great Lakes, including the necessary hydrographic and related surveys; and research pertinent to the development and improved utilization of the water resources of the Great Lakes System. Included for each chart listing is information on locality, scale, size, and price.

COLD STORAGE:

"The effect of temperature on the spoilage rate of wet white fish," by R. Spencer and C. R. Baines, article, Food Technology, vol. 18, May 1964, pp. 175-179, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

"Nouveau procédé pour la conservation par le froid des crustaces a l'état frais" (A new process for the cold storage of fresh crustaceans), article, La Revue de la Conserve, vol. 18, no. 3, May-June 1963, p. 177, printed in French. Société d'Edition pour l'Alimentation, 1 Rue de la Réale, Paris 1, France.

"Vom trawler ins lagerhaus an der wasserstrasse" (From the trawler directly to the wharf cold store), article, Ties Kuhlkette, no. 91, July 1963, p. 16, printed in German. H. E. Albrecht Verslag KG., Freihamerstrasse No. 2, Munich, Germany.

COMPOSITION:

"Chemical composition of fish and fish products," by H. Houwing, article, Voeding, vol. 24, 1963, p. 170, printed. Netherlands Journal of Nutrition, Komingin-nengracht 42, The Hague, Netherlands.

"Trace elements in far-Eastern fish, crustaceans and mollusks," by K. M. Mershina, N. M. Khalina and A. I. Krasnitskaya, article, Chemical Abstracts, vol. 59, November 25, 1963, 13270f, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

"Variations in the chemical composition of three freshwater fishes of Bhavanisagar reservoir," by A. Sreenivasan and M. V. Natarajan, article, Indian Journal of Fisheries, vol. 8, October 1961, pp. 436-439, printed. Ministry of Food and Agriculture of Government of India, New Delhi, India.

CONGO REPUBLIC:

Foreign Trade Regulations of the Republic of the Congo (Leopoldville), OBR 64-61, 8 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Discusses the Congo Republic's trade policy, import tariff system, sales and other internal taxes, documentation and fees, and labeling and marking requirements. Also covers special customs provisions, nontariff import controls, and Government representation between the Congo and the United States.

CONTAINERS:

Examen del Cierre de la Lata (Investigation of Can Seams), by Jose J. Franco Betancourt, Boletin de Divulgacion Tecnica, No. 1, 15 pp., illus., printed in Spanish with English abstract, October 1963. Centro de Investigaciones Pesqueras del Instituto Nacional de la Pesca, Playa Habana, Bauta, Cuba.

"Foam-lined cans for freeze-dried foods," article, Modern Packaging, vol. 36, January 1963, p. 70, printed. Diesel Publications Inc., 575 Madison Ave., New York 22, N. Y.

CRABS:

"Chemical control of the green crab, Carcinus maenas (L.)," by Robert W. Hanks, article, Proceedings of the National Shellfisheries Association, 1961, vol. 52, pp. 75-86, printed, 1963. National Shellfisheries Association, Virginia Institute of Marine Science, Gloucester Point, Va.

Crabs of Texas, by Sandra Pounds Leary, Bulletin No. 43, Series 7, Coastal Fisheries, 57 pp., illus., print-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

ed, revised 1964. Texas Parks and Wildlife Department, John H. Reagan State Office Bldg., Austin, Tex. Designed to aid the occasional visitor to the Texas Coast in identifying at least the general group to which a particular crab may belong and to answer some of the many questions which arise concerning those crustacea. Bulletin devoted primarily to the commercial blue crab and the stone crab.

"King crab tagging methods in Alaska," by Murray L. Hayes, article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 262-265, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, N.S., Canada.

"Nutritive value of crab meat," article, Food Manufacture, vol. 39, April 1964, p. 60, printed. Leonard Hill, Ltd., Stratford House, 9 Eden St., London NW1, England.

"Progress on blue crab research in the South Atlantic," by George H. Rees, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 100-115, printed, April 1963. Gulf and Caribbean Fisheries Institute, The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

"O sostoyanii zapasov Kamchatskogo kraba u zapadnogo poberezh'ya Kamchatki" (Condition of king crab--Paralithodes camtschatica--stocks on the western coast of Kamchatka), by M. M. Lavrent'ev, article, Rybnoe Khoziaistvo, vol. 39, no. 2, 1963, pp. 19-25, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

CRAYFISH:

Habitat of Crayfish in Poland (Rozsiedlenie Rakow w Polsce), by Jozef Kossakowski, OTS 63-11397, 5 pp., illus., processed, 1964, 50 cents. (Translated from the Polish Gospodarka Rybna, no. 5, 1956, pp. 9-10.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

CUBA:

Cuban Center of Fishery Research, by R. Buesa, JPRS 24664, 8 pp., processed, May 19, 1964, 50 cents. (Translated from the Russian, Okeanologiya, vol. 4, no. 2, 1964.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

Las Pesquerias Cubanas (The Cuban Fisheries), by Rene J. Buesa, Contribution No. 20, 90 pp., illus., printed in Spanish with English abstract, February 1964. Centro de Investigaciones Pesqueras, Instituto Nacional de la Pesca, Playa Habana, Bauta, Cuba. Deals with the characteristics of Cuban fishery activities and developments, fishing grounds, fleet and gear, and number of fishermen. Establishes the yield rates for both cooperatives and government fishing organizations according to seasons, fishing gear, and fishing grounds. Also includes a list of marine species of major commercial value.

DECOMPOSITION:

"Significance of decomposition of adenosinetriphosphate in fish muscle at temperature around -2° C," by M. Bito and K. Amano, article, Bulletin of Tokai Regional Fisheries Research Laboratory, no. 32, 1962, pp. 149-153, illus., printed in Japanese with English summary. Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

DOLPHIN:

"Sea intelligence: the dolphin," by Barbara Tufty, article, Science News Letter, vol. 86, no. 9, August 29, 1964, pp. 138-139, illus., printed, single copy 15 cents. Science Service, 1719 N St. NW., Washington, D. C. 20036. Describes the anatomy and "personality" of the dolphin, the history of man's interest in this mammal, and some of the research being conducted with it at the Communications Research Institute, Miami, Fla. The dolphin's intelligence and eagerness to learn may help in a first step towards man's communicating with animals and learning more about the sea.

ECUADOR:

"Apuntes e informaciones sobre las pesquerías en la Provincia de Manabí" (Memoranda and information on the fisheries in the Province of Manabí), article, Boletin Informativo, vol. 1, no. 2, 1964, pp. 1-66, illus., printed in Spanish, s/. 6.00 (US$0.35). Instituto Nacional de Pesca del Ecuador, Guayaquil, Ecuador. Discusses in detail the coastal fishery for shrimp, spiny lobster, and finfish; and the offshore tuna fishery.

EUROPEAN FISHERIES CONFERENCE:

Final Act of the European Fisheries Conference. London, Dec. 3, 1963 to March 2, 1964. With Fisheries Convention, Protocol of Provisional Application and Agreements as to Transitional Rights. London, March 9 to April 10, 1964, Miscellaneous No. 11 (Cmnd. 2355), printed, 1964, 2s. 7d. (50 U.S. cents). Sales Section, British Information Services, 845 3rd Ave., New York, N. Y. 10022.

FACTORYSHIP:

"Baza-przetwornia B 64 typu 'Pioniersk'" (Factory-mothership B 64 type "Pioniersk"), by Janusz Staszewski and Stanislaw Paszkowski, article, Budownictwo Okretowe, vol. 9, no. 6, June 1964, pp. 189-198, illus., printed in Polish with English summary. Wydawnictwa Czasopism Technicznych Not, Warsaw, Czackiego 3/5, Poland. On December 10, 1963, the factory-mothership Pioniersk, built by the Gdansk Shipyard for the Soviet fisheries, was commissioned. This article deals with the vessel's construction, its performance at sea, the part played by motherships in deep-sea fisheries, and accomplishments of those vessels. Topics covered include stability, hull construction, deck equipment, accommodation plan, fire fighting devices, holds, engineroom, electric equipment, repair shop, pipelines, freezing and processing plant, and delivery trials. Included are plans, diagrams, and photographs of the vessel.

FATTY ACIDS:

"Origin of the characteristic fatty acid composition of aquatic organisms," by Tibor Farkas and Sandor Herodek, article, Chemical abstracts, vol. 58, June 10, 1963, 12893g, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

"Quantitative analysis of fatty acid esters of marine animal oils by gas-liquid chromatography," by Su-

ketaka Ito and Kazuo Fukuzumi, article, Chemical Abstracts, vol. 58, June 10, 1963, 12778e, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

FISH FINDER:

"Telemetric estimation of set net catches by fish finder," by T. Koyama, article, Bulletin of Tokai Regional Fisheries Research Laboratory, no. 32, 1962, pp. 141-147, illus., printed in Japanese with English summary. Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

FISH KILLS:

"So what did kill the fish?" by Warren Kornberg, article, Chemical Week, vol. 95, no. 4, July 25, 1964, pp. 19-26, illus., printed, single copy 50 cents. McGraw-Hill, Inc., 330 W. 42nd St., New York, N. Y. 10036. Reports on the Mississippi fish kill in the fall 1963, and congressional hearings on the subject.

FISH-LIVER OIL:

"Influence of various materials on the quality of cod-liver oil. I--Metals and synthetic materials," by H.J. Papenfuss, article, Fischereiforschung, vol. 4, 1961, pp. 25-67, printed in German. Institut fur Hochseefischerei und Fischverarbeitung, Rostock-Marienehe, East Germany.

FISH MEAL:

"Assessment of protein quality in fish meal," by J. A. Lovern, article, News Summary, no. 14, May 1964, pp. 45-53, processed in English with French, German, and Spanish summaries, limited distribution. International Association of Fish Meal Manufacturers, 70 Wigmore St., London W1, England. Discusses the structure of proteins, their digestion and utilization in the body, and chemical tests for protein quality.

"Quality of fish meals and their evaluation by chemical methods," by H. Dohler, article, Nutrition Abstracts and Reviews, vol. 34, 1964, p. 45, printed. Commonwealth Bureau of Animal Nutrition, Rowett Institute, Aberdeen, Scotland.

"Utilization of fish byproducts as cattle feed: influence of the method of manufacture on the digestibility and nutritive value of 'manthal' fish meal," by S. S. Negi and N. D. Kehar, article, Journal of Scientific and Industrial Research, vol. 21C, 1962, pp. 324-328, printed. Journal of Scientific and Industrial Research, Old Mill Rd., New Delhi 2, India.

FISH OIL:

"Composition of fatty acid mixtures of various fish oils," by E. Klenk and D. Eberhagen, article, Chemical Abstracts, vol. 57, November 26, 1962, 14303d, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

FISH PASSAGE:

"Fish passage research in the Columbia River Basin," by Gerald B. Collins, article, Transactions of the Twenty-Eighth North American Wildlife and Natural Resources Conference, March 4, 5, and 6, 1963, pp. 356-360, printed, 1963. Wildlife Management Institute, Wire Bldg., Washington, D. C. 20005.

FISH PROTEIN CONCENTRATE:

"Changes in the vitamins B_1 and B_2 and PP content during the manufacture and storage of fish flour," by V. I. Treshcheva, article, Chemical Abstracts, vol. 59, July 22, 1963, 2104f, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

"Enrichment of bread with fish flour for human consumption. 1--Study of baking and acceptability tests," by Gonzalo Donoso and others, News Summary, no. 14, May 1964, pp. 78-92, processed, limited distribution. International Association of Fish Meal Manufacturers, 70 Wigmore St., London W1, England. The purpose of the study covered in this report was to ascertain the highest percentage of enrichment of bread with fish flour for human consumption manufactured in Chile which would be acceptable to the consumer. Bread-making tests were carried out with dough enriched with 3, 6, 9, and 12 percent of fish flour (replacing corresponding quantities of wheat flour). The technological aspect of bread-making was considered, and subsequently the acceptability of the product through flavor tests with individual adults at various cultural levels and with children in primary schools. The report includes, besides a description of the tests, technical specifications for the preparation of the bread, remarks on the alteration of its quality with addition of fish flour, and standards for the classification of its organoleptic and general qualities.

FLOUNDER:

Catches of Flounder PLEURONECTES FLESUS L. in the Bornholm Deep in 1951-1955 (Stornia--Pleuronectes flesus L.--w Potowach w Rejonie Bornholmskin w Latach 1951-1955), by Zbigniew Reimann, OTS 61-11365, 26 pp., illus., processed, 1964, 50 cents. (Translated from the Polish, Prace Morskiego Instytutu Rybackiego w Gdyni, no. 10/A, 1959, pp. 441-459.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

FLYINGFISH:

The Flying Fishes (EXOCOETIDAE) of the Northwest Pacific, by N. Parin, OTS 61-31031, 84 pp., illus., printed, 1963. (Translated from the Russian, Akademiya Nauk SSSR, Trudy Instituta Okeanologii, vol. 31, 1960, pp. 205-285.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

FRANCE:

"L'evolution de la congelation dans la peche maritime (France)" (Evolution of freezing in sea-fishery), by A. Andre, article, Revue Pratique du froid, vol. 16, no. 211, October 1963, pp. 51-52, printed in French. Federation nationale des activites frigorifiques, 254 rue de Vaugirard, Paris XV, France.

FREEZE-DRYING:

"Azeotropic freeze-drying," by H. E. Wistreich and J. A. Blake, article, Science, vol. 138, no. 3537, 1962, p. 138, printed. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

Conference on Freeze-Drying of Foods, Chicago, 1961, edited by Frank R. Fisher, 246 pp., illus., printed, 1962. Quartermaster Research and Engineering Com-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

mand, U. S. Army Quartermaster Corps, Washington, D. C.

"Developments in freeze-drying 1963," article, Journal of Refrigeration, vol. 6, no. 3, May-June 1963, pp. 64-65, printed. Foxlow Publishers, Ltd., 19 Harcourt St., London W1, England.

"The freeze-drying of foodstuffs. Future trends," by K. Bird, article, Marketing Transport Situation, August 1963, pp. 26-32, illus., printed. Marketing Economics Division, U. S. Department of Agriculture, Washington, D. C. 20250.

"A practical guide for selection of freeze-drying equipment," article, Quick Frozen Foods, vol. 25, no. 12, July 1963, pp. 103-105, illus., printed. E. W. Williams Publications, Inc., 82 Wall St., New York, N. Y. 10005.

"Protein changes in freeze-dried muscle," by W. Partmann and G. Nemitz, article, Zeitschrift fur Lebensmittel-Untersuchung und - Forschung, vol. 120, no. 3, pp. 190-192, printed in German. Springer Verlag, 3 Heidelberger Platz, Wilmersdorf, Berlin, Germany.

"Taste tests rate freeze-dried foods," article, Information Bulletin, T.R.R.F., no. 63, August 1963, p. 1, printed. The Refrigeration Research Foundation, 12 N. Meade Ave., Colorado Springs, Colo.

FREEZING ON BOARD:

"Das frieren von fisch auf see mit 'Jackstone-Plattengefrierapparaten' vertikaler bauart" (Freezing of fish on board with the Jackstone vertical plate freezer), article, Kalte, vol. 16, no. 5, May 1963, pp. 214-216, illus., printed in German. Hans A. Keune Verlag, Pressehaus, 1 Speersort, Hamburg 1, Germany.

"Gefrieranlagen auf hochseetrawlern" (Freezing plants on board high-sea trawlers), by E. Strohrmann, article, Kalte, vol. 16, no. 5, May 1963, pp. 211-213, illus., printed in German. Hans A. Keune Verlag, Pressehaus, 1 Speersort, Hamburg 1, Germany.

Progress in the Development of Freezing on Board the British Distant-Water Trawler Fleet, by G. C. Eddie, Torry Memoir No. 140, 13 pp., printed in English with French summary. Torry Research Station, Aberdeen, Scotland.

FRESH-WATER FISH:

Our Freshwater Fishes, Educational Series, Picture Nos. 1, 2, 3, and 4, 1964, $1.50 a set. An educational series of four 6x9-inch plastic-coated cards showing 36 species of fresh-water fish in full-color photographs. In spite of the fact that color photographs are quite common today, there is still a lack of good color photographs of fish and other marine animals. The pictures shown on these cards show the color of living fish--something which is difficult to capture. Each card shows nine species of fish, and the back of the card has concise life history notes on each fish. The fish shown on the cards are: bluegill, smallmouth bass, black crappie, pumpkinseed, largemouth bass, green sunfish, northern longear sunfish, rock bass, warmouth, lake trout, sea lamprey, yellow perch, brown trout, brook trout, lake whitefish, rainbow trout, walleye or yellow pike, brown bullhead, black bullhead, and lake sturgeon. Also shown are: longnose gar, bowfin, carp, white sucker, river redhorse, white bass, channel catfish, freshwater drum, northern pike, golden shiner, muskellunge, grass pickerel, common shiner, tiger muskie, creek chub, and river chub. Teachers, educators, students, biologists, researchers, restaurants, and dealers will find these color photograph cards ideal for differentiating between and identifying the most common fresh-water fish species. Others interested in fisheries will find that the cards would lend themselves to framing. The author-photographer also has completed 11 fish pictures for the Society for Visual Education's 13x18-inch cards for schools; he is also able to supply transparencies of about 50 species of fresh-water fish.

--Joseph Pileggi

"Razmnozhenie osnovnykh promyslovykh rby v Cheremshanskom zalive Kuibyshevskogo vodokranilishcha v 1960 i 1961 gg." (Reproduction of the principal commercial fishes in the Cheremshan inlet of Kuibyshev Reservoir in 1960 and 1961), by V. M. Chikova, article, Materialy Pobiologii i Gidrologii Volzhskikh Vodochrnailishch, pp. 95-98, printed in Russian, 1963. Akademiia Nauk SSSR, Moscow, U.S.S.R.

FROZEN FISH:

"Zur frage des eniflusses postmortaler veränderungen auf die qualität von gefrierfisch" (Effect of post-mortem changes on the quality of frozen fish), by W. Partmann and J. Gutschmidt, article, Kaltetechnik, vol. 15, no. 6, June 1963, pp. 170-177; no. 7, July 1963, pp. 200-204, illus., printed in German. Verlag C. F. Miller, Karlsruhe, Germany.

FUR SEALS:

"Evolution of fur seal management on the Pribilof Islands," by Alton Y. Roppel and Stuart P. Davey, article, Science in Alaska, Proceedings of the Fourteenth Alaskan Science Conference, Anchorage, Alaska, August 27-30, 1963, pp. 67-68, printed. Executive Secretary, Alaska Division, American Association for the Advancement of Science, College, Alaska.

GEAR:

"A modified Petersen grab," by J. Flury, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 6, 1963, pp. 1549-1550, illus., printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

"O rabote setevyborochnykh mashin razlichnykh typov" (On working performance of net-hauling machines of different types), by R. T. Mikhailov, article, Rybnoe Khoziaistvo, vol. 38, no. 1, 1962, pp. 59-64, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

"Sinteticheskiye materialy dlya osnastki orudi lova" (Synthetics for fishing gear), by V. V. Borishchev, article, Rybnoe Khoziaistvo, vol. 39, no. 2, 1963, pp. 63-67, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

GENERAL:

Fish and Wildlife, Price List 21, 15 pp., printed, April 1964 (49th Edition). Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. A complete list of publications on fish and wildlife subjects for sale by the Government Printing

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Office. Titles are compiled alphabetically according to subject, with catalog number, total pages, date of publication, and price included. An occasional descriptive sentence is shown.

GERMAN FEDERAL REPUBLIC:

"Republique Federale d'Allemagne: La modernisation de la flotte de grande peche et le programme d'aide gouvernementale" (Federal Republic of Germany: Modernization of the distant-water fishing fleet and the government's aid program), article, La Peche Maritime, vol. 43, no. 1035, June 20, 1964, pp. 443-446, illus., printed in French, single copy 20 francs (about US$4.05). La Peche Maritime, 190, Boulevard Haussmann, Paris 8e, France.

GLAZING:

"Experiment of protective effect of paste glazing made from methylcellulose, sodium carboxymethylcellulose and hydroxyethylcellulose," by K. Tanaka, article, Refrigeration (Reito), vol. 38, no. 427, May 1963, pp. 1-13, printed. Japanese Association of Refrigeration, Kenchiku Kaikan Bldg., 3-1 Ginza Nishi, Chuo-ku, Tokyo, Japan.

GREECE:

Foreign Trade Regulations of Greece, by A. Russell Romer, OBR 64-66, 8 pp., printed, June 1964, 15 cents. Bureau of Foreign Commerce, U.S. Department of Commerce, Washington, D.C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.) Discusses Greece's trade policy, import tariff system, sales and other internal taxes, documentation and fees, and labeling and marking requirements. Also covers special customs provisions, nontariff import controls, and Government representation between Greece and the United States.

HADDOCK:

"Further field experiments with tags for haddock," by Albert C. Jensen, article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 194-203, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, N.S., Canada.

"Haddock tag returns in relation to fish condition," by John P. McDermott and Robert Livingstone, Jr., article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 216-217, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, N.S., Canada.

"A study of the vertical distribution of larval haddock," by David Miller, John B. Colton, Jr., and Robert R. Marak, article, Journal du Conseil, vol. 28, no. 1, August 1963, pp. 3-49, printed. Conseil Permanent International pour l'Exploration de la Mer, Charlottenlund Slot, Denmark.

HAKE:

"An analysis of silver hake tag returns," by Raymond L. Fritz, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 214-215, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, N.S. Canada.

HERRING:

"Caught in a hail of herring," by Edgar P. Young, article, World Fishing, April 1964, pp. 60, 63-64, illus., printed. John Trundell & Partners Ltd., St. Richard's House, Eversholt St., London NW1, England. An account of six cruises by the Soviet research submarine Severyanka in the Barents Sea, January 1959-July 1963. Observations were made off the Murmansk coast of the way in which herring and other fish behave and distribute themselves during their winter migration, when they are usually in a somnolent condition. Observations of plankton concentrations, as well as conditions for best observing trawl operations, were carried out. These cruises, besides producing much interesting information which is of practical use for the fishing industry, have vindicated the great value of submarines as instruments for carrying out research in oceanography and gear utilization.

"Forecast for Scottish North Sea and west coast herring fisheries in 1964," by B. B. Parrish and A. Saville, article, Scottish Fisheries Bulletin, no. 21, June 1964, pp. 3-5, printed. Fisheries Division, Department of Agriculture and Fisheries for Scotland, Edinburg, Scotland.

"New techniques in herring fishing," by Jakob Jakobsson, article, Iceland Review, vol. 2, no. 2, 1964, pp. 44-46, 49, illus., printed, single copy 50 Icelandic Kronur (about US$1.16). Iceland Review, P.O. Box 1238, Reykjavik, Iceland.

"Prisposobitel'nye i izmeneniya rosta salaki Clupea harengus membras L. Rizhskogo zaliva v svyazi s obespechennost'yu pishchei" (Adaptive changes in the growth rates of herring, Clupea harengus membras L., of the Gulf of Riga in connection with the availability of food), by A. V. Chepurnov, article, Voprosy Ikhtiologii, vol. 3, no. 1, 1963, pp. 124-130, printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U.S.S.R.

"A revision of the recent round herrings (Pisces: Dussumieriidae)," by P. J. P. Whitehead, article, British Museum (Natural History) Bulletin, vol. 10, no. 6, 1963, pp. 305-380, illus., printed. British Museum (Natural History), London, England.

"Scales and earstones reveal age of Atlantic herring," by H. C. Boyar, article, Maine Field Naturalist, vol. 19, no. 3, March 1963, 2 pp., printed. Maine Audubon Society, and Portland Society of Natural History, 22 Elm St., Portland, Maine.

"O sel'dyanom rybolovstve v zapadnoi Atlantike" (On herring fishing in the western Atlantic), by I. G. Yudanov, article, Rybnoe Khoziaistvo, vol. 39, no. 2, 1963, pp. 14-18, printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

ICHTHYOLOGY:

The Study of Fishes Made Simple, by Eugene V. Mohr, 159 pp., illus., printed, 1962. Doubleday & Co., Garden City, N.Y.

INDIAN OCEAN:

Indian Ocean Project. Measurements of Currents Along the Equator in the Indian Ocean, by John A. Knauss and Bruce A. Taft, 4 pp., illus., printed, 1963. (Reprinted from Nature, vol. 198, no. 4878, 1963.)

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Rhode Island University, Narragansett Marine Laboratory, Kingston, R. I.

INTERNATIONAL COMMISSIONS:

(International Pacific Salmon Fisheries Commission) Annual Report, 1963, 45 pp., illus., printed, 1964. International Pacific Salmon Fisheries Commission, P.O. Box 1120, New Westminster, B. C., Canada. Describes the adverse effects of interruption in fishing by strikes or lockouts on total racial production of Fraser River sockeye salmon populations; history of salmon runs in that area; and results of regulation of the catches. Discusses the 21 formal meetings of the Commisssion held in 1963; regulations for fishing in Canadian and United States Convention waters, and emergency amendments promulgated; the sockeye salmon fishery, escapement, and rehabilitation; the pink salmon fishery, origin of catch, and escapement; and watershed protection of salmon rivers by means of flood control, fishway construction, and other devices. Includes statistical data on sockeye salmon catch by gear; cyclic landings and packs of sockeye from Convention waters; daily catches of sockeye and pinks from United States and Canadian Convention waters; Indian catches of sockeye; and escapement of sockeye and pinks to Fraser River and other spawning areas.

North-East Atlantic Fisheries Commission, Report of the Second Meeting, May 1964, 28 pp., processed in French and English, 1964. North-East Atlantic Fisheries Commission, Rm. 617, East Block, Whitehall Pl., London SW1, England. Contains a report of the proceedings of the second meeting of the North-East Atlantic Fisheries Commission. The Hague, May 12-15, 1964. The 14 member Governments, all in Europe, were represented by delegations; the United States Government, the International Council for the Exploration of the Sea (ICES), and the International Commission for the Northwest Atlantic Fisheries (ICNAF) sent observers. The Commission ruled on the area for application of minimum mesh size regulations; extended permission for use of top-side chafers on vessels until January 1, 1966; and agreed to special arrangements for allowing small boats to fish for whiting with small mesh nets in the Skagerak-Kattegat area of the North Sea. The Commission decided to request the ICES to conduct: an assessment of effects of top-side chafers on net selectivity; a reassessment of fish stocks in the north-eastern part of the Convention Area; a study of the spiny dogfish stock and the effect of possible conservation measures; and a continuing study of herring stocks. Agreement was reached on the need for a system of international control of fisheries on the high seas for enforcement of conservation measures. Therefore a resolution was passed that a special committee, on which all member Countries would be represented, should be established to study the practical problems involved and to make suggestions to the Commission at its next meeting. Plans were made to hold the third meeting in Moscow, May 11, 1965.

ITALY:

Bollettino di Pesca, Piscicoltura e Idrobiologia, vol. 18, no. 1, January-June 1963, 100 pp., illus., printed in Italian with English abstracts, single copy L. 1,200 (about US$1.90). Laboratorio Centrale di Idrobiologia, Piazza Borghese, 91, Rome, Italy. Includes, among others, articles on: "Sul problema igienico della conservazione degli alimenti: prove organolettiche e sperimentali per differenziare il pesce scongelato dal pesce fresco semplicemente refrigerato" (Some hygienic problems of food preservation: organoleptic inspection and laboratory tests for differentiating frozen fish from refrigerated fish), by Stefano Caracciolo; and "La pesca con la rete 'gangamella' nel golfo di Napoli" (Fishing with the "gangamella" trawl net in the Gulf of Naples), by Mario Santarelli and Giuseppe Micale.

JAPAN:

Data Record of Oceanographic Observations and Exploratory Fishing, No. 8, 311 pp., illus., printed in Japanese and English, March 1964. The Faculty of Fisheries, Hokkaido University, Hakodate, Hokkaido, Japan. Covers exploratory cruises to the Coral Sea, the Southern Kurile Waters, Okhotsk Sea, Indian Ocean, Bering Sea, and Northwestern North Pacific, 1962/1963.

Measures Planned for Implementation for the Coastal Fisheries in 1964, 29 pp., printed in Japanese. Japanese Fisheries Agency, Ministry of Agriculture and Forestry, 2-1, Kasumigaseki, Chiyoda-Ku, Tokyo, Japan. "White paper" on Japan's fisheries prepared for submission to the 46th (Regular) Diet Session.

1963 Annual Report on Fisheries Trends (Part 1--Report on Fisheries Trends. Part 2--Report on Measures Implemented for the Coastal Fisheries.), 112 pp., illus., printed in Japanese. Japanese Fisheries Agency, Ministry of Agriculture and Forestry, 2-1, Kasumigaseki, Chiyoda-Ku, Tokyo, Japan. "White Paper" on Japan's fisheries prepared for submisssion to the 46th (Regular) Diet Session.

JELLYFISH:

"Opredeleniie meduzy v tolshche vody" (Determination of the presence of jellyfish in midwater), by M. I. Spectorov, article, Rybnoe Khoziaistvo, vol. 37, no. 12, 1961, pp. 38-39, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

LIVESTOCK FEED:

"A comparison of Queensland whalemeals and fish meals as a protein supplement for grain-fed pigs," by A.C.E. Todd, article, Australian Journal of Experimental Agriculture and Animal Husbandry, vol. 3, p. 69, printed. Australian Journal of Experimental Agriculture and Animal Husbandry, 226 Clarendon St. East Melbourne C2, Victoria, Australia.

"Effect of the conditions of flame drying on the biological value of herring meals for pigs," by J. Delort-Laval and S. Z. Zelter, article, Annales Zootechnie, vol. 12, 1963, p. 193, printed in French. Institut National de la Recherche Agronomique, 149 Rue de Grenelle, Paris (7e), France.

Fisheries Management and Fish Byproducts in Livestock Feeding, U.S.S.R., OTS 64-31383, 33 pp., illus., processed, June 1, 1964, $1. (Translated from the Russian, Rybnoe Khoziaistvo, no. 2, 1964.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

"Herring meal, antioxidants and meat products - results of feeding trials," by H. Astrup, H. Hvidsten,

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

and L. Aure, article, Zeitschrift fur Tierphysiologie Tierernährung Futtermittelkunde, vol. 17, 1962, p. 325, printed in German with English summary. Verlag Paul Parey, Spitalerstrausse 12, Hamburg, Germany.

"Quality and quantity of protein in fattening rations for pigs. I--Soyabean meal, spray-dried skimmed milk and fish meal as protein supplements for rapid fattening of pigs," by F. Witczak, M. Kotarbinska, and F. Abgarowicz, article, Nutrition Abstracts and Reviews, vol. 34, 1964, pp. 262, printed. Commonwealth Bureau of Animal Nutrition, Rowett Institute, Aberdeen, Scotland.

LOBSTER:

"Artificial hatching and rearing of lobsters--a review," by H. J. Thomas, article, Scottish Fisheries Bulletin, no. 21, June 1964, pp. 6-9, printed. Fisheries Division, Department of Agriculture and Fisheries for Scotland, Edinburg, Scotland.

LUMPFISH:

Review of Genera and Species of Fishes of the Subfamily Cyclopterinae (Pisces) (Obzor Rodov i Vidov Ryb Podsemeistva Cyclopterinae (Pisces), by G. U. Lindberg and M. I. Legeza, OTS 61-31032, 75 pp., illus., processed, 1964, 75 cents. (Translated from the Russian, Trudy Zoologicheskogo Instituta Akademii Nauk SSSR, vol. 18, 1955, pp. 389-458.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

MACKEREL:

"Tsitofiziologicheskii analiz raspredeleniya molodi 'krupnoi' stavridy (Trachurus mediterraneus ponticus) v severnom i vostochnom raionakh chernogo morya" (Cytophysiological analysis of distribution of the young of "large" horse mackerel--Trachurus mediterraneus ponticus--in the northern and eastern Black Sea regions), by Yu. P. Altukhov, article, Zoologicheski Zhurnal, vol. 42, no. 4, 1963, pp. 589-595, illus., printed in Russian with English summary. Four Continent Book Corp., 156 5th Ave., New York, N. Y. 10010.

MAINE:

22nd Biennial Report (for Period July 1, 1960 to June 30, 1962), 48 pp., illus., printed. Department of Sea and Shore Fisheries, State of Maine, State House, Augusta, Maine. Reviews the programs of the Department of Sea and Shore Fisheries, 1960/62, with details on enforcement, inspection, supervision of salt-water sport fishing, rivers and harbors projects, progress in the lobster industry, proposed lobster research, assistance to the sardine industry, and other topics. Also covers work of the Promotion and Marketing Division in providing publicity, quality control, and other assistance to Maine's commercial fisheries. Chapters on accomplishments of the Enforcement, Marine Research, and Statistics Divisions are included.

MARINE ALGAE:

The Marine Algae of Jamaica. Part 1--Myxophyceae and Chlorophyceae, Part 2--Phaeophyceae and Rhodophyceae, by V. J. Chapman, Bulletin of the Institute of Jamaica, Science Series, No. 12, 160 pp., and 201 pp., respectively, illus., printed, 1961 and 1963. The Institute of Jamaica, Kingston, Jamaica.

MENHADEN:

The Texas Menhaden Fishery, by Ernest G. Simmons and Joseph P. Breuer, Bulletin No. 45, Series No. 2, Coastal Fisheries, 16 pp., illus., printed revised 1964. Texas Parks and Wildlife Department, John H. Reagan State Office Bldg., Austin, Tex. Discusses the biology, fishing operations, products, and economic value of the menhaden, one of the Gulf of Mexico's most valuable fish. Includes photographs and explanatory diagrams.

MEXICO:

Anuario Estadistico de Actividades Pesqueras en Aguas Territoriales Mexicanas, 1958 (Annual Statistical Report of Fishery Activities in Mexican Territorial Waters, 1958), 347 pp., printed in Spanish, 1963. Direccion General de Pesca e Industrias Conexas, Secretaria de Industria y Comercio, Mexico, D. F. Contains statistical tables on quantity and value of landings in Mexico during 1958 by species, by states and territories, and by months; quantity of processed edible and industrial fishery products by types; production of fish and shellfish by cooperatives and by private industry; and other similar data.

MINK FEED:

"Increasing amounts of fish meal and whalemeat meal in feeds for young mink, and periodical feeding with 100 percent of the fresh animal feeds replaced by dried animal feeds," by G. Jørgensen, G. Hillemann, and H. Clausen, article, Dansk Pelsdyravl, vol. 26, 1963, p. 364, printed in Danish. Dansk Pelsdyravl, Sdeasdy 8, Copenhagen, Denmark.

"Trials with different amounts of fish meal in the feed of young mink," by G. Jørgensen, article, Dansk Pelsdyravl, vol. 26, 1963, pp. 104, 106, 109, 171, 177, printed in Danish. Dansk Pelsdyravl, Sdeasdy 8, Copenhagen, Denmark.

MOROCCO:

"La industria de conservas de pescado marroqui y el Mercado Comun" (The Moroccan fish canning industry and the Common Market), article, Industria Conservera, vol. 30, no. 298, April 1964, pp. 93-94, printed in Spanish. Union de Fabricantes de Conservas de Galicia, Calle Marques de Valladares, 41, Vigo, Spain.

MULLET:

"The structure of polyenoic odd- and even-numbered fatty acids of mullet (Mugil cephalus)," by Nirmal Sen and Hermann Schlenk, article, Journal of the American Oil Chemists' Society, vol. 41, March 1964, pp. 241-247, printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

NETS:

"Cook Inlet set-netters," by Dolores D. Roguszka, article, Alaska Sportsman, vol. 30, no. 8, August 1964, pp. 6-11, 54, illus., printed, single copy 50 cents. Alaska Sportsman, Suite 10, Box 1271, Juneau, Alaska. Adventure story of a Danish family of fishermen and its success with net fishing in Alaska. Readably written, the article contains numerous photographs.

"Probleme der messwertubertragung vom netz zum schiff" (Problems connected with the transmission of measured quantities from the net to the vessel), by L. Wolff, article, Fischereiforschung, vol. 5, no. 5,

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

1962, pp. 3-7, illus., printed in German. Institut fur Hochseefischerei und Fischverarbeitung, Rostock-Marienehe, East Germany.

NORWAY:

Fiskeriinspektorenes og Samvirkekonsulentenes Virksomhet 1962 (Activities of Fishery Inspectors and Cooperatives Consultants, 1962), Arsberetning Vedkommende Norges Fiskerier, No. 11-12, 1962, 61 pp., printed in Norwegian, 1963. A.s John Griegs Boktrykkeri, Bergen, Norway.

"Die Norwegische tiefkuhlindustrie" (The Norwegian industry of deep-frozen products), article, Ties Kuhlkette, no. 92, August 1963, p. 10, illus., printed in German. H. E. Albrecht Verslag K. G., Freihamerstrasse No. 2, Munich, Germany.

OCEANOGRAPHY:

CALCOFI Atlas of 10-Meter Temperatures and Salinities, 1949 through 1959, California Cooperative Oceanic Fisheries Investigations Atlas No. 1, 1 vol. illus., printed, 1963. Marine Research Committee, Department of Fish and Game, Sacramento, Calif.

"Developing tropical Atlantic fisheries through international research," by Vernon E. Brock, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 152-155, printed, April 1963. Gulf and Caribbean Fisheries Institute, Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

"Fishery oceanography in the tropical Atlantic," by Robert C. Wilson, article, Transactions of the Twenty-Seventh North American Wildlife and Natural Resources Conference, March 12, 13, and 14, 1962, pp. 351-361, printed, February 1963. Wildlife Management Institute, Wire Bldg., Washington, D. C. 20005.

The Global Sea, by Harris B. Stewart, Jr., Van Nostrand Searchlight Book No. 17, 126 pp., illus., printed, 1963, $1.45. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. Knowledge of the seas and their resources is still limited as compared to man's knowledge of the land and even of space. But in the past 20 years a change has taken place and man has begun to realize the importance of the global sea. There have been many books written about the seas, and many more will follow. Whereas many are too detailed or too technical for the general reader, here is a small paperbound book which is a general and an adequate introduction to the seas--their buried landscapes, moving waters, marine plants and animals, and other resources and riches. Something about the more recent discoveries and research results in the study of the sea--oceanography--is presented in non-technical language. The last chapter deals with territorial waters (a controversial issue among nations today), and international cooperation in oceanography. For those who would like to delve deeper into the subject, there is a small bibliography. The book also has a small but adequate index. Covering more than 70 percent of our globe's surface, the oceans are man's last frontier on earth. The potential that the oceans hold for the betterment of mankind is just beginning to be fully realized. Any reader, no matter what his interests, will gain something of the fascination of the seas from this short summary. Students and the general public as well as those interested in any aspect of the global sea will find this as the key that will unlock the door to man's last frontier on earth.

--Joseph Pileggi

"The International Cooperative Investigation of the Tropical Atlantic," by Vernon E. Brock, article, ICO Pamphlet No. 11, pp. 33-37, printed, April 1963. Interagency Committee on Oceanography, Office of Naval Research, Rm. 1818, 17th St., and Constitution Ave. NW., Washington, D. C. 20333.

Man and the Sea, by Joel W. Hedgpeth, 28 pp., printed, April 13, 1964, $2.60. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230. The topics covered in this series of three lectures are the general principles of marine biology and oceanography, the role of marine biological stations in marine research, and the natural resources of the sea.

Oceanological Principles as Related to the Fishery Productivity of the Seas, by G. K. Izhevskii, OTS 63-11120, 193 pp., illus., processed, 1964, $2.00. (Translated by A. Birron and Z. S. Cole, from the Russian Pishchepromizdat, Moscow, 1961.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Opportunities in Oceanography, by E. John Long, Publication No. 4537, 34 pp., illus., printed, July 1964, 50 cents. The Smithsonian Institution, Washington, D. C. 20560. Discusses the need for young people in the various fields of oceanographic work, the challenges to be found in the seas, types of oceanographic research and qualities required to perform them, and other related sciences. Also covers various types of oceanographic cruises, the work of land-based laboratories, the Federal Government's part in this research work, and oceanography in industry. Information is given on how to become an oceanographer, the value of sea experience, obtaining financial assistance, how and where to study, qualifications for Federal employment, and the availability of scholarships and assistanceships. A final word is given on expected future accomplishments in oceanography and the hope of the late President John F. Kennedy that we may "drive back the frontiers of the unknown in the waters which encircle our globe."

"Overview of Government-Industry Oceanographic Instrumentation Symposium," by Julius Rockwell, Jr., article, Proceedings of the Navy Research and Development Clinic, Raton, New Mexico, September 1961, pp. C-1-C-6, printed, 1963. Office of Naval Research, Rm. 1818, 17th St. and Constitution Ave. NW., Washington, D. C. 20333.

OCEAN PERCH:

"Effect of tagging on redfish growth rate at Eastport, Maine," by George F. Kelly and Allan M. Barker, article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 210-213, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P. O. Box 638, Dartmouth, N. S., Canada.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Estimation of population size and mortality rates from tagged redfish, Sebastes marinus L., at Eastport, Maine," by George F. Kelly and Allan M. Barker, article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 204-209, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P. O. Box 638, Dartmouth, N. S., Canada.

OYSTERS:

Experiments in Oyster Culture, by Luis Castillo, Translation Series No. 367, 11 pp., printed, 1961. (Translated from the Spanish, Imprenta Cervantes, vol. 50, 1910.) Fisheries Research Board of Canada, Biological Station, St. Andrews, N. B., Canada.

"The Government-industry co-operative oyster research program. III--Processing studies; IV--Procedure for determining solids change," by A. Kramer and others, articles, Journal of the Association of Official Agricultural Chemists, vol. 45, 1962, pp. 1011-1050, printed. Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C. 20004.

"Index of condition and percent solids of raft-grown oysters in Massachusetts," article, Proceedings of the National Shellfisheries Association, vol. 52, pp. 47-52, printed, June 1963, National Shellfisheries Association, Virginia Institute of Marine Science, Gloucester Point, Va.

"El mercado inglés de la ostra" (The English market for oysters), article, Informacion Conservera, vol. 12, no. 123-124, March-April 1964, p. 112, printed in Spanish, single copy 30 pesetas (about 50 U. S. cents). Informacion Conservera, Colón, 62, Valencia, Spain.

"Progress in oyster mortality studies," by James B. Engle and Aaron Rosenfield, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 116-124, April 1963. Gulf and Caribbean Fisheries Institute, Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

PERU:

Estudio de la Fauna Ictiologica de los Esteros y Parte Baja de los Rios del Departamento de Tumbes (Peru) (Study of the Ichthyological Fauna of the Estuaries and Lower Reaches of the Rivers of the Department of Tumbes, Peru), by Norma Chirichigno F., Serie de Divulgacion Cientifica 22, 87 pp., illus., printed in Spanish, 1963. Servicio de Pesqueria, Ministerio de Agricultura, Lima, Peru.

PESTICIDES:

"Pesticides - a new factor in coastal environments," by Philip A. Butler and Paul F. Springer, article, Transactions of the Twenty-Eighth North American Wildlife and Natural Resources Conference, March 4, 5, and 6, pp. 380-390, printed. Wildlife Management Institute, Wire Bldg., Washington, D. C. 20005.

POLLUTION CONTROL:

"Aquatic life needs protection," by Clarence M. Tarzwell, article, Chemical Engineering Progress, vol. 59, no. 11, November 1963, pp. 27-28, illus., printed, single copy $3. American Institute of Chemical Engineers, Editorial and Advertising Offices, 345 E. 47th St., New York, N. Y. 10017. Prime objective of aquatic biologists in the water pollution field is to set up water quality criteria essential for the protection and maintenance of aquatic life, according to the author. These standards must protect the most sensitive species; average conditions are a poor measure since extremes of environment can render streams unfit for fish the year round. It is suggested that tentative water quality criteria be established immediately and that research be conducted to devise methods by which organisms can be used in the transformation of waste matter into useful material.

POULTRY FEED:

"Comparison of the nutritive value of fish meal and fermented fish meal in chick rations," by N. Reyntens and L. Keppens, article, Revue de l' Agriculture, Brussels, vol. 15, 1962, p. 1520, printed. Ministre de l' Agriculture, 14 Rue de la Limite, Brussels 3, Belgium.

POULTRY NUTRITION:

"The action of fish meal of different origins on the growth of chicks," by R. Fangauf, H. Vogt, and W. Penner, article, Archiv fur Geflugelkunde, vol. 27, part 2, 1963, p. 135, printed in German. Fritz Pfenniustorff, Herworthstrasse 3, Berlin-Lichlerfelde-1, Germany.

QUALITY:

Determinacao Quantitativa do Ranco por Auto-Oxidacao pelo Acido 2-Tiobarbutirico (Quantitative Determination of Rancidity through Autoxidation by Use of 2-Thiobarbutiric Acid), by Luis Torres, and Romano Granger, Notas Mimeografadas No. 31, 13 pp., illus., processed in Portuguese with French and Spanish summaries, 1962. Centro de Biologia Piscatoria, Lisbon, Portugal.

"Direct gas chromatographic analysis as an objective method of flavor measurement," by W. W. Nawar and I. S. Fagerson, article, Food Technology, vol. 16, no. 11, 1962, pp. 107-109, illus., printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

"Discoloration of marine animal products. Part I," by Masamichi Toyomizu and Yukio Tomiyasu, article, Chemical Abstracts, vol. 59, October 28, 1963, 10695e, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

The Sensory Assessment of Iced Whitefish by a Panel Technique, by J. M. Shewan and A.C.S. Ehrenberg, Torry Memoir No. 88, 7 pp., illus., printed in English with French and Spanish summaries, 1962. Torry Research Station, Aberdeen, Scotland.

"The significance of variations in the nucleotide, amino acid, and carbohydrate contents of fish muscle in relation to quality evaluation," by F. Bramstedt, article, Chemical Abstracts, vol. 58, March 4, 1963, 4972c, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

RADIOACTIVE WASTES:

"Accumulation of radionuclides by aquatic organisms," by Theodore R. Rice, article, Studies of the Fate of Certain Radionuclides in Estuarine and Other Aquatic Environments, Public Health Service Publication No.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

999-5-3, pp. 35-50, printed, May 1963. Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, D. C. 20201.

"Savannah estuary environmental radiological survey (SEERS) project," by Julius J. Sabo, John P. Baptist, and Fred G. Rueter, article, Studies of the Fate of Certain Radionuclides in Estuarine and Other Aquatic Environments, Public Health Service Publication No. 999-R-3, pp. 11-33, printed, May 1963. Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, D. C. 20201.

REFRIGERATION:

"Kaltetechnische einrichtung von fischfang und -fabrikschiffen" (Refrigerating plants on board fishing-boats and factoryships), by W. Flechtenmacher, article, Kaltetechnik, vol. 15, no. 10, October 1963, pp. 314-320, illus., printed in German. Verlag C. F. Miller, Karlsruhe, Germany.

RESEARCH VESSEL:

"Flip Returns from Mid-Pacific Research Cruise," by John Northrop, 1 p., printed, March 1964. (Reprinted from Transactions, American Geophysical Union, vol. 45, no. 1, March 1964, p. 165.) Marine Physical Laboratory, University of California, San Diego, Calif.

"Porpoise--Summary Report," by K. R. Marsh, Report No. 2 55400 4R50209, 24 pp., printed, June 10, 1964. Ling-Tempo Vought, Dallas, Tex. Describes a buoyancy-propelled underwater vehicle designed for utilization initially as an oceanographic research vessel. Intended to descend and ascend alternately as it glides through the water. Buoyance control is utilized to effect the depth change and to obtain a thrust force along the flight path. Vessel is equipped with wings hinged on a skewed axis for stability.

Predictions of the Collapse Strength of Three HY-100 Steel Spherical Hulls Fabricated for the Oceanographic Research Vehicle "Alvin," by Thomas J. Kiernan, DTMB 1792, 41 pp., printed, March 1964, $1.25. Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

"Report on the new Albatross IV," by Robert L. Edwards, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 55-59, printed, 1963. Gulf and Caribbean Fisheries Institute, Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

ROE:

"Color changes on fish roe products dyed black," by J. Winziger, article, Chemical Abstracts, vol. 59, August 5, 1963, 9401e, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

SALMON:

"Atlantic salmon in the U.S.S.R.," by Nikolai I. Kozhin, article, The Atlantic Salmon Journal, no. 2, June 1964, pp. 3-4, 7, illus., printed. Atlantic Salmon Association, 1559 McGregor St., Montreal 25, Canada. Discusses the occurrence of the Atlantic salmon (Salmo salar L.) in the Baltic, Barents, and White Seas; fluctuations of the catch from year to year; and average annual catch, 1954-56, of about 3.7 million pounds. Also covers the management of Atlantic salmon rivers; the rearing of smolt in 10 months with a special feed; Soviet research agencies concerned with artificial salmon breeding and other biological activities; efforts to acclimatize two Pacific salmon species (Oncorhynchus keta and O. gorbuscha) to Atlantic environments; and Soviet membership in international organizations concerned with salmon.

Comparative Analysis of the Desmoltification Process Among the Young of Different Ecological Forms of Atlantic Salmon, by N. V. Evropeytseva, Translation Series No. 431, 24 pp., illus., printed, 1963. (Translated from the Russian, Uchenye Zapiski Leningradskogo Gosudarstvennogo Universiteta, no. 311, 1962, pp. 46-73.) Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada.

"Influence of freshwater environment on survival of coho salmon," by William A. Smoker, article, Proceedings of the Sixteenth International Congress of Zoology, vol. 1, 1963, p. 245, printed. Secretary, Permanent Committee of International Zoological Congresses, 105 Blvd. Raspail, Paris 6, France.

"Nutrition of salmonoid fishes. XI--Iodine requirements of chinook salmon," by A. N. Woodall and Gilles LaRoche, article, Journal of Nutrition, vol. 82, April 1964, pp. 475-482, printed. American Institute of Nutrition, 36th St. at Spruce, Philadelphia 4, Pa.

"Opyt akklimatizatsii gorbushi i kety v basseine Barentsova i Belogo morei" (Experimental acclimatization of pink and chum salmon in the basin of the Barents and White Seas), by V. V. Azbelev and S. S. Surkov, article, Akklimatizatsia zhivotnykh v SSSR, pp. 210-211, printed in Russian, 1963. Akademiia Nauk Kazakhskoi SSSR, Alma-Ata, U.S.S.R.

"Passage of salmon fingerlings through small tunnels," by Theodore H. Blahm, article, Transactions of the American Fisheries Society, vol. 92, no. 3, July 1963, pp. 302-303, printed. American Fisheries Society, 1404 New York Ave. NW., Washington, D. C. 20005.

"Produtsirovanie spermy tikhookeanskimi lososyami roda Oncorhynchus" (Sperm production in Pacific Ocean salmon of the genus Oncorhynchus), by A. I. Smirnov, article, Voprosy Ikhtiologii, vol. 3, no. 1, 1963, pp. 84-98, printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U.S.S.R.

"The reproduction of salmon in Scandinavia and the British Isles," by Wilfred M. Carter, article, The Atlantic Salmon Journal, no. 2, June 1964, pp. 22-26, illus., printed. Atlantic Salmon Association, 1559 McGregor St., Montreal 25, Canada.

"Scientists probe riddle of salmon's death," article, The Atlantic Salmon Journal, no. 2, June 1964, pp. 20-21, illus., printed. Atlantic Salmon Association, 1559 McGregor St., Montreal 25, Canada.

"Study of amino acids, free or as components of protein, and of some B-vitamins in the tissues of the Atlantic salmon, Salmo salar, during spawning migration," by C. B. Cowey, K. W. Daisley, and G. Parry,

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

article, Comparative Biochemistry and Physiology, vol. 7, 1962, p. 29, printed. Comparative Biochemistry and Physiology, 122 E. 55th St., New York 22, N. Y.

SALT FISH:

A Report to the Fishing Industry on a Method for the Accelerated Cooling of Green, Heavily Salted Fish, by A. L. Wood, New Series Circular No. 12, 2 pp., processed, 1962. Technological Station, Fisheries Research Board of Canada, P. O. Box 429, Halifax, N. S., Canada.

SAURY:

"Lov sairy nasosom s primeneniem sveta i eletrotoka" (Pacific sauries taken by pump with the help of light and electric current), by I. V. Nikonorov and A. Kh. Pateev, article, Rybnoe Khoziaistvo, vol. 39, no. 2, 1963, pp. 51-53, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R. Reviews the use of pumps and lights for catching sprat in the Caspian Sea. This method was used experimentally for catching other fish, particularly Pacific sauries, in other regions but did not give satisfactory results until 1962. A successful standard fish-pumping installation is illustrated in this article. Though research and experiments are not completed, the authors recommend that a few vessels be equipped with fish-pumping installations for commercial purposes.

SCALLOPS:

"Tagging as a technique in population studies of the sea scallop," by J. A. Posgay, article, North Atlantic Fish Marking Symposium, Special Publication No. 4, pp. 268-271, printed, 1963. International Commission for the Northwest Atlantic Fisheries, Bedford Institute of Oceanography, P. O. Box 638, Dartmouth, N. S., Canada.

SEA LAMPREY:

The Use of Alkalinity and Conductivity Measurements to Estimate Concentrations of 3-trifluormethyl-4-nitrophenol Required for Treating Lamprey Streams, by Richard K. Kanayama, Technical Report no. 7, 10 pp., printed, November 1963. Great Lakes Fishery Commission, Natural Resources Bldg., University of Michigan, Ann Arbor, Mich.

SHRIMP:

"Abundance of postlarval shrimp--one index of future shrimping success," by Kenneth N. Baxter, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 79-87, printed, April 1963. Gulf and Caribbean Fisheries Institute, The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

"Expanded research on Gulf of Mexico shrimp resources," by Joseph H. Kutkuhn, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 68-79, printed, April 1963. Gulf and Caribbean Fisheries Institute, The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

The Recent Genera of the Caridean and Stenopodidean Shrimps (Class Crustacea, Order Decapoda, Supersection Natantia) with Keys for Their Determination, by Lipke B. Holthuis, 157 pp., illus., printed, 1955. E. J. Brill, Oude Rijn, 33a, Leiden, Netherlands.

"On some aspects of quality of cooked frozen prawns," by V. Krishna Pillai and A. Lekshmy, article, Indian Journal of Fisheries, vol. 8, October 1961, pp. 440-448, printed. Ministry of Food and Agriculture of Government of India, New Delhi, India.

SMALL BUSINESS MANAGEMENT:

Following issued by Small Business Administration, Washington, D. C. 20416:

How Do You Know What Your Business is Worth? by G. H. B. Gould and Dean C. Coddington, Management Aid for Small Manufacturers No. 166, 4 pp., processed, August 1964. Although small businessmen need to place a value on their businesses when negotiating for funds, when settling estates, or when selling out, there is no standard formula for determining value. Often value is subjective--what a person thinks the business is worth to him. This leaflet discusses three methods for estimating value: asset valuation, market worth, and capitalized earnings value. In this last method, two steps are used. First, you find a company's true earning power, based on both its past experience and future probabilities. Second, you capitalize these earnings at a rate which is realistic for the risks involved. The leaflet concludes that the capitalized earnings approach is the most valid because that method embodies all the factors in valuation.

Pricing, Production, and Marketing Policies of Small Manufacturers, by Robert F. Lanzillotti and Gordon O. Parrish, Management Research Summary, 2 pp., processed, 1964. The study discussed in this summary is based on an analysis of the pricing practices of 256 small manufacturers located in the State of Washington and having fewer than 250 workers. Typically, more than half the production of the firms consisted of standard products for inventory. Generally these firms did not make detailed analysis of production and distribution costs. They relied heavily on rules-of-thumb in their pricing. About three-fourths of them tried to set prices so as to realize a predetermined profit rate. Net profits on sales before taxes averaged only 5.9 percent for this group during the 1950-1959 period. However, since many of the unincorporated firms did not deduct owner-managers' salaries as a cost, they did not in fact realize any return at all on invested capital.

Problems in Small Business Management, by William Rotch, Management Research Summary, 2 pp., processed, 1963. The report summarized in this leaflet consists of a collection of case studies of small businesses and some readings related to various aspects of small-business management. Each case is a description of a real business--its people, products, and operations. Five groups of cases are presented: starting a business; developing a business; financing a firm; major expansion of a company; and special situations involving personnel or other types of problems. The purpose of the study was to develop material for a course or seminar in the management of small enterprises.

The Relation of Management Decision Making to Small Business Growth, by F. Parker Fowler, Jr. and E. W. Sandberg, Management Research Summary, 2 pp., processed, 1964. One approach to helping small businesses is based on the idea that they differ from large businesses in kind as well as in size. The study sum-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

marized in this leaflet (of 43 Colorado manufacturers with identical products) classifies the owner-managers as: the conservative operator, managing a relatively stable firm; the aggressive innovator, achieving a rapid growth pattern; and the industry stalwart, desiring status in the industry for his firm. Also shown is that the small business owner-manager differs from the hired manager in that the former specifies both his firm's goals and the means by which they are to be attained. The recommendation is made that assistance to individual firms should include the construction of internal information systems.

Value Analysis for Small Business, by Daniel D. Roman, Technical Aids for Small Manufacturers No. 87, 4 pp., processed, May-June 1964. Value analysis (sometimes called value engineering or value control) is a technique that aims to find new ways to get equal or superior performance from a product or method at lower costs, while retaining quality, function, and reliability. Its concept is that it is easier to increase profits by reducing costs than by increasing sales. Checking with experts, exchanging ideas, watching for unreasonable specifications, knowing where to get factual help, and using ingenuity instead of merely following custom and tradition--all these and more are the techniques used in value analysis. This leaflet explains the principles of value analysis and how they can be adapted to small business use; reports various instances of successful use of this technique; and makes certain suggestions for company acceptance.

SMALL CRAFT:

The following color-illustrated charts, each 23 by 37 inches, are available free from Touring Service, Mobil Oil Company, 150 E. 42nd St., New York, N.Y. 10017:

Cruising Guide 1--Eastport, Maine, to Barnegat Inlet, New Jersey, Including Long Island and New York City Waters.

Cruising Guide 2--Montreal, Canada to Key West, Florida, Including St. Lawrence River, Hudson River, Delaware Bay, and Chesapeake Bay.

Cruising Guide 3--Great Lakes, Thousand Islands, New York Waterways, Ohio River, Mississippi River, Gulf Coast from Mobile, Alabama, to Brownsville, Texas, Plus Selected Areas.

Cruising Guide 4--Pacific Coast from Puget Sound to San Diego and Colorado River.

SMOKING:

"Optimization of the electrostatic smoking process," by J. Tilgner and Z. E. Sikorski, article, Fleischwirtschaft, vol. 15, no. 5, 1963, pp. 391-395, illus., printed in German with English, French, Italian, and Spanish summaries. Verlafshaus Sponholz Gmbh, Kockstrasse 60-61, Berlin SW 68, Germany.

SPINY LOBSTER:

Contribucion al Conocimiento de las Langostas del Pacifico Mexicano y su Pesqueria (Contribution to the Knowledge of the Spiny Lobster of the Mexican Pacific Coast and Its Fishery), by Hector Chapa Saldaña, 67 pp., illus., printed in Spanish with English summary, 1964. Instituto Nacional de Investigaciones Biologico-Pesqueras, Secretaria de Industria y Comercio, Direccion General de Pesca e Industrias Conexas, Mexico, D. F.

Sobre los Estadios Larvales de la Langosta Comun PANULIRUS ARGUS (On the Larval Stages of the Spiny Lobster Panulirus argus), by Julio A. Baisre, Contribution No. 19, 37 pp., illus., printed in Spanish with English abstract, January 1964. Centro de Investigaciones Pesqueras, Instituto Nacional de la Pesca, Playa Habana, Bauta, Cuba. In this study, 121 phyllosoma larvae of the spiny lobster were found in the stomach contents of skipjack and blackfin tuna and in plankton samples collected from Cuban fishing grounds. All 11 stages, with the exception of stage III, were identified among the specimens examined.

"Lobster fishery off the southwest coast of India," by H. Miyamoto and A. T. Shariff, article, Indian Journal of Fisheries, vol. 8, no. 2, 1961, pp. 252-268, illus., printed. Indian Journal of Fisheries, Ministry of Food and Agriculture, New Delhi, India.

"Report on South African rock lobsters--Notes on the reproductive biology and size limit of S. A. rock lobsters. Part 2," by A.E.F. Heydorn, article, The South African Shipping News and Fishing Industry Review, vol. 19, no. 6, June 1964, pp. 93, 95, 97-99, 101, 103-105, illus., printed, single copy 30 cents (about 42 U.S. cents). Thomson Newspapers, South Africa (Pty.) Ltd., P.O. Box 80, Cape Town, South Africa Republic. Deals with the attainment of sexual maturity and the reproductive potential of the South African spiny lobster Jasus lalandii (Milne Edwards), and the importance of these factors in relation to the determination of minimum size limits.

SPRAT:

"O podvodnykh nabliudeniiakh za poviedeniiem kilki" (On underwater observations of the behavior of sprats), by I. V. Nikonorov, article, Rybnoe Khoziaistvo, vol. 38, no. 1, 1962, pp. 32-36, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

SQUID:

"Studies on the relationship between current boundary zones in waters to the southeast of Hokkaido and migration of the squid, Ommastrephes sloani pacificus (Steenstrup)," by Tsuneyoshi Suzuki, article, Memoirs of the Faculty of Fisheries, Hokkaido University, vol. 2, no. 2, 1963, pp. 75-153, illus., printed. Faculty of Fisheries, Hokkaido University, Hakodate, Japan.

STANDARDS:

State of California Standards and Specifications--Seafoods; Fresh, Frozen, and Processed Fish; Inspection, Testing, and Certification, T63-p-17, 87 pp., processed, August 1, 1963. Purchasing Division, Department of Finance, State of California, Sacramento, Calif. Contains the State of California specifications for fresh, frozen, and processed fish and shellfish, and inspection, testing, and certification procedures. Also incorporates all of the National Association of State Purchase Officials (NASPO) specifications for fishery products developed by the U.S. Bureau of Commercial Fisheries Gloucester Technological Laboratory. Those include specifications for frozen

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

ocean-perch fillets and Pacific ocean-perch fillets; chilled and frozen cod or haddock fillets; scallops--frozen raw, frozen raw breaded and frozen fried breaded; fish portions--frozen raw, frozen raw breaded and frozen fried breaded; shrimp--raw or cooked--chilled or frozen; and shrimp--frozen raw breaded. In addition to adopting the NASPO specifications verbatim, the State requires USDI inspection and grading of all products. All standardized products purchased by the State must be U.S. Grade A quality.

STERN-TRAWLERS:

"Le premier grand chalutier portugais a pêche par l'arrière" (The first large Portuguese stern-trawler), article, La Pêche Maritime, vol. 43, no. 1035, June 20, 1964, pp. 468-471, illus., printed in French, single copy 20 francs (about US$4.05). La Pêche Maritime, 190, Boulevard Haussmann, Paris 8e, France.

"Réflexions sur les chalutiers a pêche par l'arrière et estimation des temps de manoeuvre" (Thoughts on the stern trawler and estimates of operating time), by M. Birkhoff, article, La Pêche Maritime, vol. 43, no. 1035, June 20, 1964, pp. 409-413, illus., printed in French, single copy 20 francs (about US$4.05). La Pêche Maritime, 190, Boulevard Haussmann, Paris 8e, France.

SUBMARINES FOR RESEARCH:

"Employment of submarines for scientific research," by Donald W. Strasburg, article, Proceedings of the Hawaiian Academy of Science, 38th Annual Meeting, 1962/1963, p. 13, printed, 1963. University of Hawaii, Honolulu, Hawaii.

SWEDEN:

"Aktuella ekonomiska problem inom fisket" (Present economic problem in the fishery), by Ingemar Gerhard, Svenska Vastkustifiskaren, vol. 34, no. 13-14, July 15, 1964, pp. 274-275, printed in Swedish. Svenska Vastkustfiskarnas, Centralforbund, Ekonomiutskoffet Postbox 1014, Goteborg 4, Sweden.

THAWING:

"Thawed frozen foods," article, Information Bulletin, T.R.R.F., no. 63, August 1963, p. 3, printed. The Refrigeration Research Foundation, 12 N. Meade Ave., Colorado Springs, Colo.

TOXICITY:

Fish Intoxication, Notes on Ciguatera, Its Mode of Action and a Suggested Therapy, by A. H. Banner and others, SPC TP141, 26 pp., printed, September 1963, 75 cents. Office of Technical Services, U.S. Department of Commerce, Washington, D.C. 20230. Certain characteristics of the toxin causing ciguatera are reviewed, and it is pointed out that there is no method of recognizing specific fish which may bear the toxin, nor of detecting the toxin in a fish except by feeding tests, nor of destroying the toxin by any normal means of food preparation. Some aspects of the pharmacology of the toxin and a possible similarity in action of the toxin to the curariform drugs are discussed. Case histories are presented in which recovery, partial or complete, might be attributed to neostigmine or neostigmine-Tensilon therapy. Chemical and pharmacological studies are reviewed which show similarities between the toxin found in a barracuda from Guam and red snappers from the Line Islands.

"Japanese puffer fish," article, Science News Letter, vol. 86, no. 9, August 29, 1964, p. 139, printed, single copy 15 cents. Science Service, 1719 N. St. NW., Washington, D. C. 20036.

"Toxicological action of sodium pentachlorophenol and hexachlorophene on fish and other aquatic animals," by Hans Joachim Bandt and Dietwart Nehring, article, Chemical Abstracts, vol. 58, April 29, 1963, 9451g, printed. American Chemical Society, 1155 16th St. NW., Washington, D. C. 20006.

TRAWLING:

"Size selection of fish by otter trawls: results of recent experiments in the Northwest Atlantic," by John R. Clark, Special Publication No. 5, pp. 24-96, printed, 1963. International Commission for the Northwest Atlantic Fisheries Commission, Bedford Institute of Oceanography, P.O. Box 638, Dartmouth, N.S., Canada.

"Za traleniia na povyshennykh skorostaikh" (Trawling at increased speeds), by V. I. Kaplan, A. B. Lishin, and E. I. Zaitsev, article, Rybnoe Khoziaistvo, vol. 38, no. 5, 1962, pp. 30-44, printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

TUNA:

"Detection of green-meat tuna before cooking," by Chujiro Nagaoka and Naotatsu Suzuki, article, Food Technology, vol. 18, May 1964, pp. 183-187, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

"Refrigeration and freezing plant for tuna fishing boats," article, Sabroe News, no. 54, June 1963, illus., printed. Thomas Sabroe and Co. Ltd., Aarhus, Denmark.

"Ricerche sugli amminoacidi del tonno in Scatola" (Studies on Amino Acids in Canned Tuna), by Duilio Pirati, article, Industria Conserve, vol. 39, no. 2, April-June 1964, pp. 102-107, illus., printed in Italian with English summary, single copy L. 1,500 (about US$2.40). Stazione Sperimentale Industria Conserve Alimentari, Viale Tanara 33, Parma, Italy.

"Tuna trolling and its prospects in New Caledonia," by R. Criou, article, Technical Paper, no. 134, 1961, pp. 1-13, illus., processed. South Pacific Commission, Box 5254, G.P.O., Sydney, Australia.

"Will tuna research change direction?" by Vernon E. Brock, article, Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, November 1962, pp. 50-52, printed, April 1963. Gulf and Caribbean Fisheries Institute, Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

TUNA AND MACKEREL:

Preliminary Field Guide to the Mackerel- and Tuna-Like Fishes of the Indian Ocean (Scombridae)," by Bruce B. Collette and Robert H. Gibbs, 48 pp., printed, 1963, Smithsonian Institution, Washington, D. C. 20560.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

TUNA AND TUNALIKE:

The following articles appeared in Proceedings of the World Scientific Meeting on the Biology of Tunas and Related Species, La Jolla, California, 1962, FAO Fisheries Report No. 6, vol. 3, 1963. Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Processed in English with French and Spanish summaries:

"Albacore scouting in the eastern North Pacific Ocean," by Leo Pinkas, pp. 1343-1353.

"The California albacore fishery logbook system," by William Craig, pp. 1217-1255, illus.

"California's tuna record gathering system," by Edward C. Greenhood, pp. 1367-1379, illus.

"Changes in availability of albacore in the eastern Pacific Ocean 1952 and 1958," by James H. Johnson, pp. 1227-1235, illus.

"Climatic parameters and the Hawaiian skipjack fishery," by Gunter R. Seckel, pp. 1201-1208, illus.

"Comparative distribution of eggs, larvae and adults in relation to biotic and abiotic environmental factors," by Hiroshi Yabe, Yoichi Yabuta, and Shoji Ueyanagi, pp. 979-1009, illus.

"A contribution to the biology of Philippine tunas," by Inocencio A. Ronquillo, pp. 1683-1752, illus.

"Distribution and abundance of tuna related to wind and ocean conditions in the Gulf of Tehuantepec, Mexico," by Maurice Blackburn, pp. 1557-1582, illus.

"Distribution and relative abundance of tunas in relation to their environment," by Taivo Laevastu, pp. 1835-1851, illus.

"Distribution of the yellowfin tuna Neothunnus macropterus (Temminck and Schlegel) in the tuna longline fishing grounds of the Pacific Ocean," by Tadao Kamimura and Misao Honma, pp. 1299-1328, illus.

"Effects of water temperature on the distribution of some scombrid fishes along the Pacific coast of North America," by John Radovich, pp. 1459-1475, illus.

"A first examination of the abundance and distribution of yellowfin and albacore tuna in the western tropical Atlantic, 1957 to 1961," by Flavio Rodrigues Lima and John P. Wise, pp. 1515-1521, illus.

"Fishing techniques for tunas and skipjack," by Shigene Takayama, pp. 1067-1076.

"Food of Indian tunas," by P. T. Thomas and M. Kumaran, pp. 1659-1667, illus.

"Food of Pacific albacore in the California fishery (1955-1961)," by Harold B. Clemens and Robert A. Iselin, pp. 1523-1535, illus.

"Food of skipjack in the central Pacific," by Kenneth D. Waldron and Joseph E. King, pp. 1431-1457, illus.

"Future lines of tuna research, mainly in relation to fisheries oceanography," by Michitaka Uda, pp. 1087-1095.

"Growth and sexual dimorphism in growth of bigeye tuna (Thunnus obesus). A preliminary report," by Richard S. Shomura and Betty Ann Keala, pp. 1409-1417, illus.

"Investigation of tuna behavior by fish finder," by Minoru Nishimura, pp. 1113-1123, illus.

"The matter of availability and the harvest of tunas," by Gerald V. Howard, pp. 1041-1055, illus.

"Measurement of the shape of the tuna long-line and an analysis of its efficiency," by Chikamasa Hamuro, pp. 1133-1142, illus.

"A method for computing estimates and variances of relative log fishing powers of California albacore vessels," by Norman J. Abramson, pp. 1209-1215, illus.

"A method of sampling the Pacific albacore (Thunnus germo) catch for relative age composition," by David J. Mackett, pp. 1355-1366.

"A model of albacore migration in the north Pacific Ocean," by Harold B. Clemens, pp. 1537-1548, illus.

"Monofilament gill net fishing for skipjack tuna in Hawaiian waters. A progress report," by Richard S. Shomura, pp. 1177-1199, illus.

"An outline of the tuna longline grounds in the Indo-Pacific. Preliminary report," by Akira Suda, Tsutomu Koto, and Susumu Kume, pp. 1163-1176, illus.

"The past, present and future status of the tuna resources of the Trust Territory of the Pacific Islands," by Peter T. Wilson, pp. 1633-1638.

"Preliminary experiments with Tilapia as bait in the tuna fishery off the coast of Brazil," by Jose Bonifacio Gomes da Fonseca, pp. 1109-1112.

"Schooling behavior within aggregations composed of yellowfin and skipjack tuna," by Heeny S. H. Yuen, pp. 1419-1429, illus.

"Seasonal and annual variation of the hooking-rate and annual variation of the catch-quantity of tuna and marlin in the tropical Atlantic Ocean," by J. Nakagome and S. Suzuki, pp. 1279-1297, illus.

"Size and composition of tuna stocks," by Johs Hamre, pp. 1023-1039, illus.

"Spawning of the oceanic skipjack, Katsuwonus pelamis (Linnaeus), in the Laccadive Sea," by G. Raju, pp. 1669-1682, illus.

"Statistics of catch and effort required for scientific research on the tuna fisheries," by Milner B. Schaefer, pp. 1077-1086.

"Structure of the albacore stock and fluctuation in the catch in the North Pacific areas," by Akira Suda, pp. 1237-1277, illus.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Studies of oceanic fronts in the mouth on the Gulf of California, an area of tuna migrations," by Raymond C. Griffiths, pp. 1583-1605, illus.

"Subpopulation identification," by John C. Marr, pp. 1011-1021.

"Thermal relationships of tuna in the oceanic Northwest Atlantic," by James L. Squire Jr., pp. 1639-1657, illus.

"Tuna landings and production 1916-1961," by Edward C. Greenhood and Sterling P. Davis, pp. 1395-1407, illus. California tuna catch and production are compared with those of the United States and the world.

"Tuna tagging experiments in Norwegian waters," by Johs Hamre, pp. 1125-1132, illus.

"Tunas (genus Thunnus) of the western North Atlantic. III--Distribution and behavior of Thunnus species," by Frank J. Mather III, pp. 1159-1161.

"World-wide tuna research planning," by Wilbert McLeod Chapman, pp. 1097-1107.

Processed in French with English and Spanish summaries:

"Description des stades post-larvaires et juveniles de Neothunnus albacora (Lowe de l'Atlantique tropico-oriental" (Description of post-larval and juvenile stages of Neothunnus albacora (Lowe) of the eastern tropical Atlantic), by E. Marchal, pp. 1792-1811, illus.

Processed in Spanish with English and French summaries:

"Especies del genero Sarda en el Pacifico Oriental," (Species of the genus Sarda in the Eastern Pacific), by Aurora Chirinos de Vildosa, pp. 1549-1556, illus.

"La pesqueria del bonito en el Peru," (The bonito fisheries in Peru), by Felipe Ancieta, pp. 1607-1819, illus.

"Resultados del programa de marcado de atun en aguas espanolas" (Results of tuna-tagging plan in Spanish waters), by Julio Rodriguez-Roda, pp. 1813-1822, illus.

"Talla, peso, edad y crecimiento del atun del Golfo de Cadiz, Espana" (Length, weight, age and growth of tuna from Gulf of Cadiz, Spain), by Julio Rodriguez-Roda, pp. 1823-1834, illus.

UNDERWATER SOUNDS:

"An indication of underwater sound production by squid," by Robert T. B. Iversen, Paul J. Perkins, and Richard D. Dionne, article, Nature, vol. 199, no. 4890, July 20, 1963, pp. 250-251, printed. St. Martin's Press, Inc., 175 Fifth Ave., New York, N. Y. 10010.

UNITED STATES GOVERNMENT:

United States Government Organization Manual, 1964-65, 791 pp., illus., printed, revised June 1, 1964, $1.75. Office of the Federal Register, National Archives and Records Service, General Services Administration, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) The official organization handbook of the Federal Government. Contains the Constitution of the United States and sections describing the agencies in the legislative, judicial, and executive branches of the Government as well as executive departments and independent agencies. Supplemental information includes brief discussions of quasi-official agencies, selected multilateral international organizations, selected bilateral organizations, charts of the principal Federal agencies, and appendices relating to abolished and transferred agencies and to Government publications. Also includes descriptions of agencies working in fisheries and related fields: Interagency Committee on Oceanography, U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries, and Bureau of Sport Fisheries and Wildlife.

U.S.S.R.:

Fisheries Research in Russia, A Historical Survey, by P. G. Borisov, OTS 63-11121, 192 pp., illus., processed, 1964, $2.00. (Translated by Malkah Raymist from the Russian, Gosudarstvennoe Izdatel'stvo "Vysshaya Shkola," Moscow, 1960.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Hydroacoustical Station Paltus, U.S.S.R., by V. P. Averkiyev, OTS 64-31276, 32 pp., illus., processed, May 18, 1964, 75 cents. (Translated from the Russian, Sudovyye Rybopoiskovyye i Elektronavigatsionnyye Pribory, 1963.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Materialy Rybokhoziastvennykh Issledovanii Severnogo Basseina--Vypusk II (Fishery Research in the Northern Basin. Part 2), 170 pp., printed in Russian, 1964. Gosudarstvennyi Komitet po Rybnomu Khoziaistvu pri SNKH SSSR; Poliarnii Nauchno-Issledovatel'skii i Proiektnyi Institut Morskogo Khoziaistva i Okeanografii im. N. M. Knopovicha PINRO), Murmansk, U.S.S.R. Includes, among others, articles on: "Forecasting of the natural basis for the trawl fishery in the central elevation area of the Barents Sea," by K. G. Konstantinov; "Assessment of abundance of single year-classes of Atlantic Scandinavian herring," by I. G. Judanov; "Sizes of mature cod in the Arcto-Norwegian stock in 1959, 1960 and 1961," by A. S. Baranenkova and N. S. Khokhlina; "Some peculiarities in menhaden morphology," by E. E. Gusev; "Dynamics of age composition, maturation and spawning of cod on the Flemish Cap Bank," by A. I. Postolaky; "Results of estimation of the abundance of young cod and haddock in the Barents Sea in Winter 1962/63," by Z. P. Baranova and G. P. Nizovtsev; "Influence of transportation conditions on the future state of eggs and larvae of the Far East salmons," by L. A. Galkina; "Distribution of seals in the Jan-Mayer area and hydrometeorological conditions in the fishing period of 1963," by V. A. Potelov and F. L. Seleznev; "On the distribution of shrimps in the Labrador and Newfoundland areas," by V. I. Mikhalkovich; "Influence of the trawling speed upon the catchability of the bottom trawl," by E. I. Zaitsev; "On the use of fish finders," by O. I. Chatoba and M. N. Shcherbino; "The use of echo sounder when fishing under ice," by A. A. Ganjkov and O. N. Kiselev; and "To the

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

problem of increase in profitableness of the trawl fishery in the Barents Sea," by V. I. Zakurdaev.

Transactions of the Murmansk Marine Biological Institute, FTD TT-63-663, 396 pp., printed, January 27, 1964, $5. (Translated from the Russian, Akademiya Nauk SSSR, Murmanskii Morskoi Biologicheskii Institut, vol. 3, no. 7, 1961, pp. 1-220.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230. Contents: procedure for the collection of phytoplankton; ways in which crustaceans adapt to changes in the chemical nature of the external environment; the survival rate of humpbacked salmon (Oncorhynchus gorbuscha Walb.) fry in relation to the mode of transfer from fresh to sea water; active selective reaction of humpbacked salmon fry in relation to sea water; pigment reaction of the cod to uniform and nonuniform backgrounds; the migrations of sexually immature cod and the reasons for variations in them; and other studies.

Trudy PINRO, Vypusk 15, 1963--Akklimatizatsiia Tikhookeanskikh Lososei v Basseine Barentseva i Belogo Morei; Materialy po Biologii Treski i Morskikh Mlekopitaiushchikh Severa (Acclimatization of Pacific Salmon in Barents and White Sea Basins; Biology of Cod and Marine Mammals of the Soviet North), 286 pp., printed in Russian. Poliarnii Nauchno-Issledovatel'skii i Proiktnyi Institut Morskogo Khoziaistva in Okeanografii im. N. M. Knipovicha, Moscow, U.S.S.R. Includes, among others, these articles: "Data on the acclimatization of pink salmon in the basin of the Barents and White Seas," by V. V. Azbelev and A. A. Jakovenko; "Experiments on regulation of the maturing of pink salmon," by O. B. Sakun, and G. M. Persov; "Observations on seaward migration of young pink and chum salmon in the European north," by E. L. Bakshtansky; "Rearing of young pink and chum salmon in sea water," by E. L. Bakshtansky; "On the variability of the pink salmon selective reaction to sea water," by G. D. Bocharov; "Cod of the Murman Coast," by T. I. Glebov; "Observations on the feeding of cod and haddock in the Barents Sea," by N. S. Novikova and V. I. Nikhalkovich; "Some features of the capelin ecology (Mollotus villosus villosus Muller) in the Barents Sea," by V.S. Prokhorov; "The autumn-winter distribution of prespawning and spawning concentrations of polar cod (Boreogadus saida, Lepechin) in the Barents Sea," by V. P. Ponomarenko; "Materials on the biology and fishery of the Newfoundland harp seal," by R. Sh Khuzin; "On the distribution and biology of the Greenland hooded seal," by R. Sh. Ghuzin and M. Ja. Jakovenko; and "Age determination and data on the breeding whale," by R. Sh. Khuzin.

VENEZUELA:

Foreign Trade Regulations of Venezuela, OBR 64-73, 8 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. 20402. To encourage domestic industry, tariff and nontariff controls are utilized to protect domestic manufacturers from foreign competition by restricting imports of competing commodities, and to stimulate investment and expansion by permitting the relatively unrestricted entry of capital goods and primary materials required for production. All exports of Venezuelan origin are free of duties. This report discusses, besides trade policy, Venezuela's import tariff system, sales and other internal taxes, documentation and fees, labeling and marking requirements, and special customs provisions. Also covers her nontariff trade controls, export regulations, United States import and export controls, and diplomatic representation between the two countries.

VITAMIN A:

"On the factors of isomerization of vitamin A in fish liver oil," by H. Baba, article, Japanese Journal of Nutrition, vol. 21, 1963, p. 3, printed. Daiichi Shuppan K.K., 39, 1-chome, Kanda Jimbo-cho, Chiyoda-ku, Tokyo, Japan.

"Growth effect of vitamin A in fish liver oil on chicks," by H. Baba, article, Japanese Journal of Nutrition, vol. 21, 1963, p. 8, printed. Daiichi Shuppan K.K., 39, 1-chome, Kanda Jimbo-cho, Chiyoda-ku, Tokyo, Japan.

WEATHER CHARTS:

The following processed weather charts, 2 pp. each, are published by the Weather Bureau, U. S. Department of Commerce, Washington, D. C., and are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, 10 cents each. Charts show stations displaying small craft, gale, whole gale, and hurricane warnings, explanations of warning displays, and schedules of AM and FM radio and TV stations that broadcast weather forecasts and warnings.

Coastal Warning Facilities Chart, Cape Hatteras, N.C., to Brunswick, Ga., 1964.

Coastal Warning Facilities Chart, Eastport, Me., to Montauk Point, N. Y., 1964.

Coastal Warning Facilities Chart, Manasquan, N. J., to Cape Hatteras, N. C., and Chesapeake Bay, 1964.

Coastal Warning Facilities Chart, Montauk Point, N.Y., to Manasquan, N. J., 1964.

Coastal Warning Facilities Chart, Puerto Rico and Virgin Islands, 1964.

Small Craft, Gale, and Whole Gale Warning Facilities Chart, Great Lakes: Huron, Erie, and Ontario, 1964.

Small Craft, Gale, and Whole Gale Warning Facilities Chart, Great Lakes: Superior and Michigan, 1964.

WEST AFRICA:

Foreign Trade Regulations of the West African Customs Union (Dahomey, Ivory Coast, Mali, Mauritania, Niger, Senegal, Upper Volta) and Togo, by G. Michael Bache, OBR 64-60, 12 pp., printed, June 1964, 15 cents. Bureau of Foreign Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Each member of the Union (Dahomey, Ivory Coast, Mali, Mauritania, Niger, Senegal, and Upper Volta) has a commercial agreement with France which provides that France will furnish economic assistance in certain specified forms. In return, the member of the Union undertake to buy certain commodities from France and the franc zone either exclusively or in a

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

specified percentage. Togo has entered into a similar agreement with France. This leaflet presents information on the import tariff system, sales and other internal taxes, documentation and fees, mail shipments, and labeling and marking requirements of those African countries. Also covers special customs provisions, nontariff import controls, export controls, United States foreign trade controls, and diplomatic representation between those countries and the United States.

"Résultats préliminaires de la campagne Thalassa au large du Rio de Oro et de la Mauritanie" (Preliminary results of the fishing expedition of Thalassa off the coasts of Rio de Oro and Mauritania), by Cl. Maurin, article, Science et Peche, no. 112, 1963, 12 pp., illus., printed in French. L'Institut Scientifique et Technique des Peches Maritimes, 59 Ave. Raymond-Poincare, Paris 16^{e}, France.

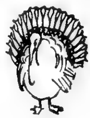
WHALE OIL:
"Composition of spermaceti," by M. Wellendorf, article, Nature, vol. 198, no. 4885, 1963, pp. 1086-1087, printed. St Martin's Press, Inc., 175 Fifth Ave., New York, N.Y. 10010.

WHALES:
"Progress report on biological studies of the larger cetacea in the waters off California," by Dale W. Rice, article, Norsk Hvalfangst-Tidende, no. 7, 1963, pp. 181-187, printed. Hvalfangerforeningen, Sandefjord, Norway.

WHALING:
"Pacific Coast whaling and whale research," by Dale W. Rice, article, Transactions of the Twenty-Eighth North American Wildlife and Natural Resources Conference, March 4, 5, and 6, 1963, pp. 327-335, printed. Wildlife Management Institute, Wire Bldg., Washington, D. C. 20005.

WHITING:
"Effect of chilled storage on the frozen storage life of whiting," by J. A. Peters, E. H. Cohen, and F. J. King, article, Food Technology, vol. 17, no. 6, June 1963, pp. 109-110, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

YELLOW PIKE:
"The movement, heterogeneity, and rate of exploitation of walleyes in northern Green Bay, Lake Michigan, as determined by tagging," by Walter R. Crowe, Earnest Karvelis, and Leonard S. Joeris, article, Conseil Permanent International pour l'Exploration de la Mer, Rapports et Proceedings-Verbaux des Reunion, vol. 370, 1963, pp. 38-41, printed. Conseil International pour l'Exploration de la Mer, Charlottenlund Slot, Charlottenlund, Denmark.



RUSSIAN THEORIES ON THE INFERIOR QUALITY OF HATCHERY-REARED CHUM SALMON FRY

A Russian fishery scientist has proposed some interesting theories concerning the often discussed inferior quality of hatchery-reared fry. His conclusions were based on observations of the chum salmon (Oncorhynchus keta), but might also apply to other salmonids.

According to N. N. Disler, hatchery fry emergent on the flat surface of trays or troughs occur in a head-down position. This causes the oil droplet of the yolk sac to occupy an unnatural posterior position where it causes temporary deformation of the intestine and prevents the passage of food. Disler further contends that, because of the nature of the artifical environment, hatchery fry begin to swim at an earlier age than wild fry. As a result of the exhausting movements of the hatchery fry, the fat content of their bodies--after all the yolk material has been absorbed--is only one-fourth that of wild fry.

In order to avoid defects in the structure and behavior of hatchery fry, Disler recommends that the facilities for holding young chum salmon should more nearly approximate the natural environment. He suggests that several layers of large pebbles should be spread on the bottom of the holding containers, and water should be introduced from the bottom through the pebbles.

A translation of Disler's paper entitled "Development of Autumn Chum Salmon in the Amur River" can be obtained for 50 cents from the Office of Technical Services, U. S. Department of Commerce, Washington, D. C. (The Progressive Fish-Culturist, July 1964.)

14,000-FOOT MOUNTAIN DISCOVERED IN PACIFIC

The discovery of an undersea mountain in the Pacific Ocean comparable to Mt. Whitney, the tallest in the United States outside Alaska, was disclosed on August 25, 1964, by the Coast and Geodetic Survey, U. S. Department of Commerce.

The new discovery was made July 23, by the C&GS Ship Pioneer while on a six-months international scientific expedition to the Indian Ocean. The 30,000-mile cruise of the 312-foot "floating laboratory" ended August 11 when the ship returned to its home port of Oakland, Calif. Its findings will take years for scientists to evaluate.

The undersea mountain showed up on the vessel's depth-sounding equipment about 175 miles south of Wake Island, between Hawaii and Guam, where the ocean is almost $3\frac{1}{2}$ miles deep. Although it was 3,800 feet below the surface of the sea, it rose at least 14,130 feet above the ocean floor. California's Mt. Whitney, in the Sierra Nevada Mountains, is 14,495 feet high.

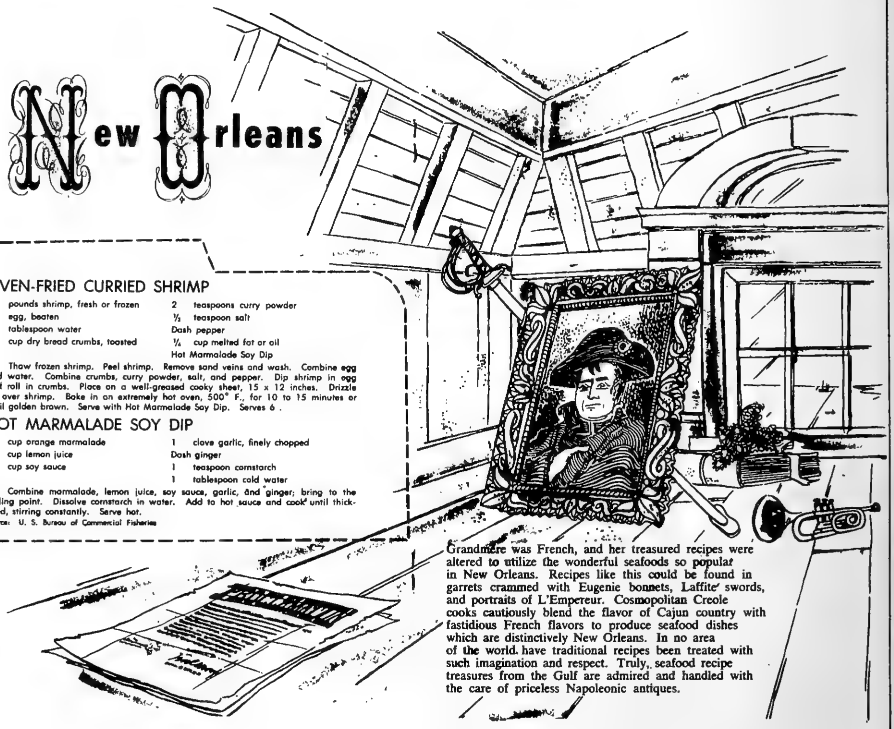
The commanding officer of the Pioneer said the undersea mountain (termed a seamount by oceanographers) could be taller than the height recorded. "We sailed over it only once," he explained, "and the site where we recorded 14,130 feet may not have been the highest point."

A C&GS oceanographer (who participated in the Indian Ocean expedition) said the seamount was formerly an island which probably sank beneath the ocean about 50,000,000 years ago. He said, "The seamount is similar to any one of the Hawaiian Islands, but this one sank beneath the ocean over a great period of time because of its enormous size. The crust of the ocean bottom is just not sufficiently strong to withstand a load of such dimensions. The new seamount is probably an extinct volcano like so many others in the Pacific Basin. They seem to form in groups on long linear rises or swells of the sea floor crust. Lava is spewed out above hot spots in the earth's mantle, that part of the earth's interior which surrounds the central core." He further stated that the seamount was "a new mountain, geologically speaking," adding that "the great mystery of Pacific seamounts is why we can not find any really old ones. Unlike mountains on land, seamounts are shielded from erosion," explained the oceanographer, "so, like mountains on the moon, they should last virtually forever."

Seamounts have a practical importance aside from their interest to scientists. For ships, most of which are now equipped with sounding devices, they furnish a method for establishing a fixed position on the often trackless sea. The location of seamounts, especially those which are not too far below the surface of the ocean, is also of strategic importance to submarines.

The new seamount will probably be named and its position will subsequently appear on nautical charts.

New Orleans



OVEN-FRIED CURRIED SHRIMP

2	pounds shrimp, fresh or frozen	2	teaspoons curry powder
1	egg, beaten	½	teaspoon salt
1	tablespoon water	Dash pepper	
1	cup dry bread crumbs, toasted	¼	cup melted fat or oil
		Hot Marmalade Soy Dip	

Thaw frozen shrimp. Peel shrimp. Remove sand veins and wash. Combine egg and water. Combine crumbs, curry powder, salt, and pepper. Dip shrimp in egg and roll in crumbs. Place on a well-greased cooky sheet, 15 x 12 inches. Drizzle fat over shrimp. Bake in an extremely hot oven, 500° F., for 10 to 15 minutes or until golden brown. Serve with Hot Marmalade Soy Dip. Serves 6 .

HOT MARMALADE SOY DIP

⅓	cup orange marmalade	1	clove garlic, finely chopped
¼	cup lemon juice	Dash ginger	
¼	cup soy sauce	1	teaspoon cornstarch
		1	tablespoon cold water

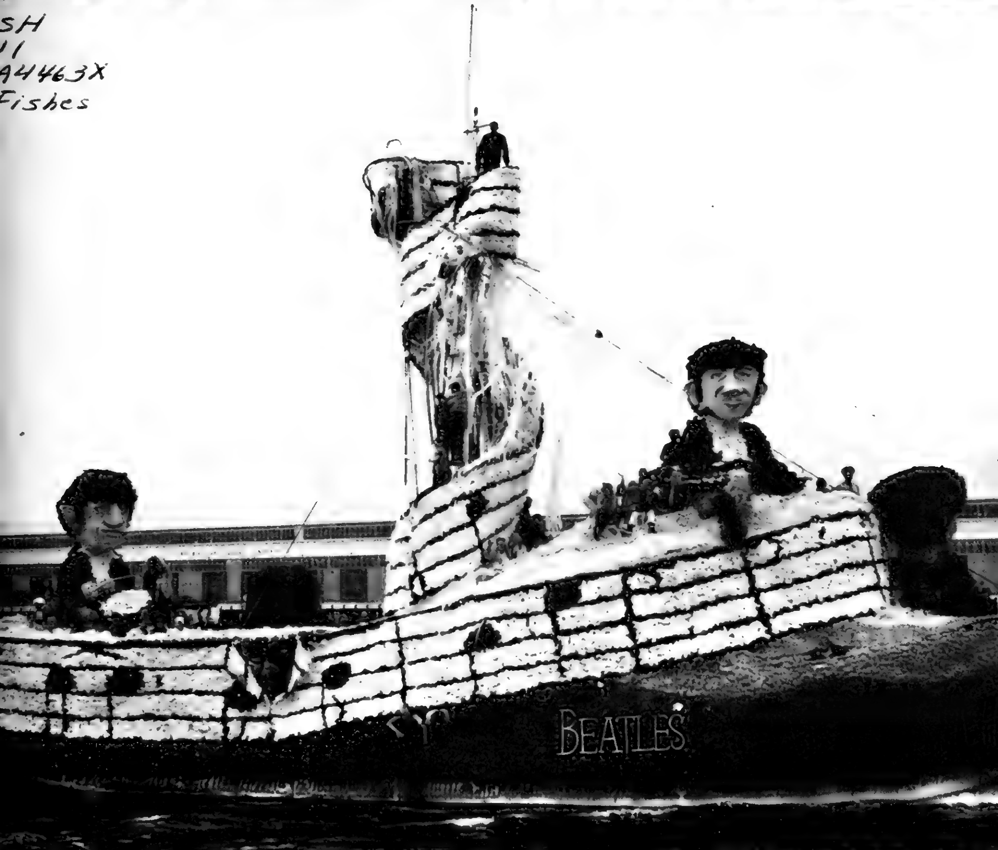
Combine marmalade, lemon juice, soy sauce, garlic, and ginger; bring to the boiling point. Dissolve cornstarch in water. Add to hot sauce and cook until thickened, stirring constantly. Serve hot.

Source: U. S. Bureau of Commercial Fisheries

Grandmère was French, and her treasured recipes were altered to utilize the wonderful seafoods so popular in New Orleans. Recipes like this could be found in garrets crammed with Eugenie bonnets, Laffite swords, and portraits of L'Empereur. Cosmopolitan Creole cooks cautiously blend the flavor of Cajun country with fastidious French flavors to produce seafood dishes which are distinctively New Orleans. In no area of the world have traditional recipes been treated with such imagination and respect. Truly, seafood recipe treasures from the Gulf are admired and handled with the care of priceless Napoleonic antiques.

--"Heirloom Seafood Recipes to Treasure,"
Special Fisheries Marketing Bulletin,
U. S. Bureau of Commercial Fisheries,
Washington, D. C.

COMMERCIAL FISHERIES REVIEW



VOL. 26, NO. 12

DECEMBER 1964

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

FISH AND WILDLIFE SERVICE
CLARENCE F. PAUTZKE, COMMISSIONER

BUREAU OF COMMERCIAL FISHERIES
DONALD L. MCKERNAN, DIRECTOR

DIVISION OF RESOURCE DEVELOPMENT
RALPH C. BAKER, ASST. DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
G. A. Albano and H. Beasley, Assistant Editors

Address correspondence and requests to the: Chief, Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, May 1, 1963.

5/31/68

CONTENTS

COVER: The purse-seine fishing vessel North Pacific, transformed into a beautifully decorated float, won first prize in the San Pedro 14th Annual Fishermen's Fiesta, October 23-25, 1964. The shore-and-water pageant this year consisted of over 30 commercial fishing vessels transformed into decorated floats. The decorated boats paraded along the main channel of Los Angeles Harbor. An annual event, it is attended by over 100,000 spectators and is televised nationwide. Tradition for the fiesta dates back into the 1930's when San Pedro fishermen celebrated a good season by decorating their boats with pennants and taking their families for a cruise. San Pedro continues to lead United States fishing ports--1963 landings amounted to 374 million pounds of fishery products valued at $32 million.

Contents continued page II.

CONTENTS (CONTINUED)

Contents continued page III.

CONTENT (CONTINUED)

Contents continued page IV.

CONTENTS (CONTINUED)

* * * * *

Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

P. 10 (figs. 36 & 37)--F. B. Sanford; p. 23--Public Relations Office, Port of Seattle; p. 24--Alaska Dept. of Fish and Game; pp. 32 & 33--Biological Laboratory, Honolulu, Hawaii; pp. 44 & 45--Biological Laboratory, Galveston, Texas; p. 50--Robert K. Brigham; p. 55--Oregon State University, Dept. of Oceanography, Corvallis, Oreg.; p. 57--Technological Laboratory, Gloucester, Mass.; pp. 63 (left side), 93, and 101 (right side)--U. S. Coast Guard; p. 67--Tyner and Murphy, Kansas City, Mo.; pp. 84, 85, & 87--Info. Services, Dept. of Fisheries of Canada; p. 96--Genepesca Sede di Roma; p. 104--United Nations, Visual Information Section, Dept. of Public Information; p. 106--R. S. Croker; p. 107--H. Kristjonsson.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price 60 cents (single copy). Subscription Price: $6.50 a year; $2 additional for foreign mailing.

COMMERCIAL FISHERIES REVIEW

December 1964 Washington, D.C. Vol. 26, No. 12

CRAB INDUSTRY OF CHESAPEAKE BAY AND THE SOUTH--AN INDUSTRY IN TRANSITION

By Charles F. Lee* and F. Bruce Sanford**

ABSTRACT

The blue crab industry is in the initial stage of a fundamental change from hand preparation to machine preparation. Concurrently, it is scrutinizing its methods of capturing the crabs and of marketing the manufactured products to improve them also, and thereby ensure economic well-being.

INTRODUCTION

The blue crab industry ranks third in value of all the food-fish industries of the Chesapeake Bay, the South Atlantic Coast, and the Gulf of Mexico Coast, being outranked only by those based on shrimp and oysters. This important industry, which furnishes employment to a large number of people has for several years, however, faced serious economic difficulty.

Owing to the complex nature of the raw material, blue crab meat is still produced almost entirely by manual methods. The solution of its economic problems, however, requires more than mechanization, for the problems extend from the high cost of capturing the blue crabs (Callinectes sapidus), on the one hand, to marketing the manufactured product on the other. The purpose of this article therefore is to briefly discuss those three problems.

To put the problems into perspective, we shall first consider certain background information in regard to catch. Then in the light of this knowledge, we shall consider briefly the problems at each end of the chain of operations from sea to consumer--that of capture and that of marketing. Finally, we shall consider the problem of production, which is the one that is receiving immediate attention by the industry.

DISTRIBUTION OF CATCH

The blue crab industry was begun at Hampton Roads, Va., over 75 years ago, and for some time, fishing was concentrated along the shores of the Chesapeake Bay. During the last few decades, however, the industry has expanded, and fishing now is fairly evenly divided between Chesapeake Bay and the South Atlantic and Gulf Coasts. The total catch has fluctuated from year to year, but has been in the general range of 100 to 150 million pounds.

The proportionate share of the participating states also varies yearly, but the distribution reported in table is typical. Maryland and Virginia, North Carolina, Georgia, Florida, and Louisiana are the most important producers, normally accounting for 85 to 90 percent of the total catch. The seven other states account for the remaining 10 to 15 percent.

*Supervisory Chemical Engineer, U. S. Bureau of Commercial Fisheries Technological Laboratory, College Park, Md.
**Chemist-in-Charge, U. S. Bureau of Commercial Fisheries, Branch of Reports, Seattle, Wash.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 718

Production of picked meat bears little relation to the catch of hard crabs in any given state. This lack of close correlation exists partly because in some cities--such as New Orleans, Baltimore, and Washington--hard crabs sold whole are very popular. Also, the differences in apparent yield of picked meat from the catch of hard crabs result from the fact that several states--for example, South Carolina, Virginia, New Jersey, and Delaware--ship some or most of their crabs to plants in neighboring states, where the meat is picked. Maryland is the most notable importer of live crabs; but Georgia, Mississippi, and Florida also import appreciable amounts and therefore produce more picked meat than their share of the catch would lead one to expect.

Production of Hard Crabs and Picked Meat, 1961

Rank	State	Production			
		Hard Crabs		Picked Meat	
		Million Pounds	Percentage of Total	Million Pounds	Percentage of Total
1	Virginia	44.0	29.8	3.95	23.3
2	Maryland	26.7	18.0	4.98	29.4
3	Florida W. Coast	17.1	11.6	2.07	12.2
4	North Carolina	15.9	10.8	1.86	11.0
5	Georgia	12.3	8.3	1.44	8.5
6	Louisiana	11.9	8.1	0.48	2.8
7	Florida E. Coast	7.5	5.1	1.19	7.0
8	South Carolina	4.7	3.2	0.21	1.2
9	Texas	2.9	2.0	0.35	2.1
10	Mississippi	2.5	1.7	0.34	2.0
11	Alabama	0.8	0.5	0.08	0.5
12	Delaware	0.8	0.5	None	-
13	New Jersey	0.6	0.4	"	-
	Total	147.7	100	16.95	100

PROBLEM OF CAPTURE

The catch of hard crabs has declined each year since the 1960 peak of 149 million pounds. Undoubtedly the normal, and still largely unexplained, variation in the population available to the crab fisherman is the cause of part of this decline. A recent survey (Lee, Knobl, and Deady 1963a), however, brought out other causes. Catching methods have changed hardly at all in decades, and exploratory studies are needed to investigate crab populations in deeper waters and in other areas not now being fished.

PROBLEM OF MARKETING

Blue crabs are marketed as whole hard crabs, live, or steamed; as soft crabs; and as picked crab meat. Most of the crab meat is marketed fresh, but some is canned, and increasing amounts are being pasteurized. Frozen crab-speciality products such as deviled crab, crab cakes, and crab creole are also increasing in popularity.

Fig. 1 - Live crabs are a popular item in the famous French Market in New Orleans. The proprietor knows that blue crabs have a belligerent disposition and uses long tongs as the safest way to handle them.

Fig. 2 - Cans of freshly picked crab meat are nested in ice along with catfish and other Southern delicacies in this French Market stall.

Pasteurization, a process in which the hermetically-sealed crab meat is heated to about 170° F. and held at that temperature for a short time, enables the packer to keep his product in refrigerated storage for several months. Pasteurized crab meat, when properly processed and stored, retains the flavor and texture of the fresh product. A trend to an in-

crease in the production of pasteurized meat and frozen specialty products has been in evidence over the past decade, for the industry has shared in the increasing popularity of convenience foods.

Considerable quantities of crab meat are used in the frozen specialty products previously mentioned. Production of those items in 1961 amounted to 7.0 million pounds valued at $7.4 million.

Canned blue crab, although second in value to frozen specialty items, is a popular product in inland areas. The value of the 1961 pack of canned meat (all styles) amounted to about $860,000.

Marketing methods have remained relatively the same over many years. Except for the Philadelphia and New York areas, the distribution of fresh crab meat is still largely limited to the coastal states where crabs are caught. Despite progress in developing new market forms such as pasteurized meat and frozen specialties, there is much yet to be done in that direction, for a considerable amount of fresh crab meat is lost each season because of spoilage or is sold at prices too low to pay the cost of production. Finding a solution to the problems of marketing will greatly benefit the industry (Lee et al. 1964).

PROBLEM OF PRODUCTION

In September 1961, the Department of Labor included crab pickers under a revision of the Fair Labor Standards Act. That Act requires that laborers be paid a minimum wage of $1 an hour, which is to be raised, in two steps, to $1.25 an hour by September 1965.

Historically, blue crab meat has been picked by hand, and the pickers have been paid on the basis of the amount they could produce. At the piece-work rate, however, many workers did not earn the minimum wage of $1 an hour, and very few earned the $1.25 hourly rate that will eventually be required by law.

SURVEY: In 1961, Congress appropriated funds for developing means to save the blue crab industry from the financial difficulties that its members felt would result from the new wage regulations. A research and development firm (The American Scientific Corporation of Alexandria, Va.) has been working under contract on the problem since October of that year.

The first step in the contractor's investigation was to survey the industry (Lee, Knobl, and Deady 1963a). As is evident from figure 3 (prepared by the contractor), blue crab plants are widely distributed along almost 2,000 miles of coastline in over 100 locations. The plants vary greatly in size, employing from 3 to more than 75 pickers, and vary also in the ways in which crabs are handled. In the multiple-flow sheet (fig. 4, developed from information collected during the aforementioned survey), the 15 vertical series of dots represent different sequences of handling in which the 28 possible suboperations--between the arrival of the live crabs at the receiving end of the plant and the movement of the final product from the shipping room--were observed in one or more of the plants surveyed.

PROGRESS TOWARDS SOLUTION: The factors of location, difference in size, type of operation, and economic condition of the individual firms greatly complicate the problems involved in providing some measure of economic relief. After the contractor made his survey, he concluded that several relatively inexpensive machines that could be used either independently or in combination would provide the flexibility in level of mechanization that the industry requires. Initially, however, because of the time required to develop machines of this type, the contractor suggested that a higher rate of production might be obtained through maximum utilization of the workers' skills. A plan for providing the industry some measure of immediate economic relief through worker specialization was discussed in a second report of the contractor's studies (Lee, Knobl, Abernethy, and Deady, 1963b).

At the present time, the contractor is working on the first of the proposed machines. This will, when perfected, clean the crab core and prepare it for extraction of the lump meat.

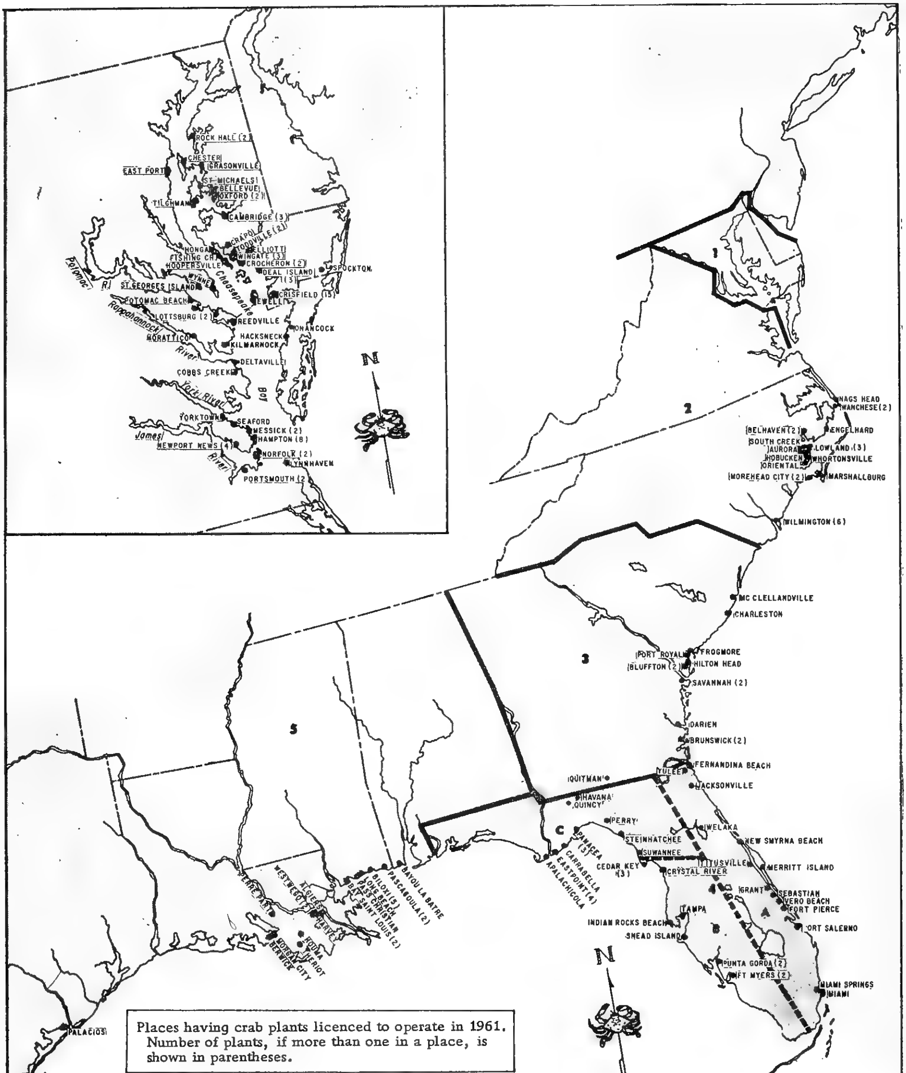


Fig. 3 - Crab-plant locations. The blue crab meat pack of the 1961 season was processed in over 170 plants scattered widely along the coastline from Upper Chesapeake Bay to Central Texas. Plants differed greatly in size and, as shown, were mostly located in or near small towns. Among the 106 plant sites shown are tiny fishing villages such as Frogmore, Deal Island, Toddville, Honga, and Fishing Creek. This scattered pattern of production greatly complicates the successful mechanization needed to restore the industry's economic well being.

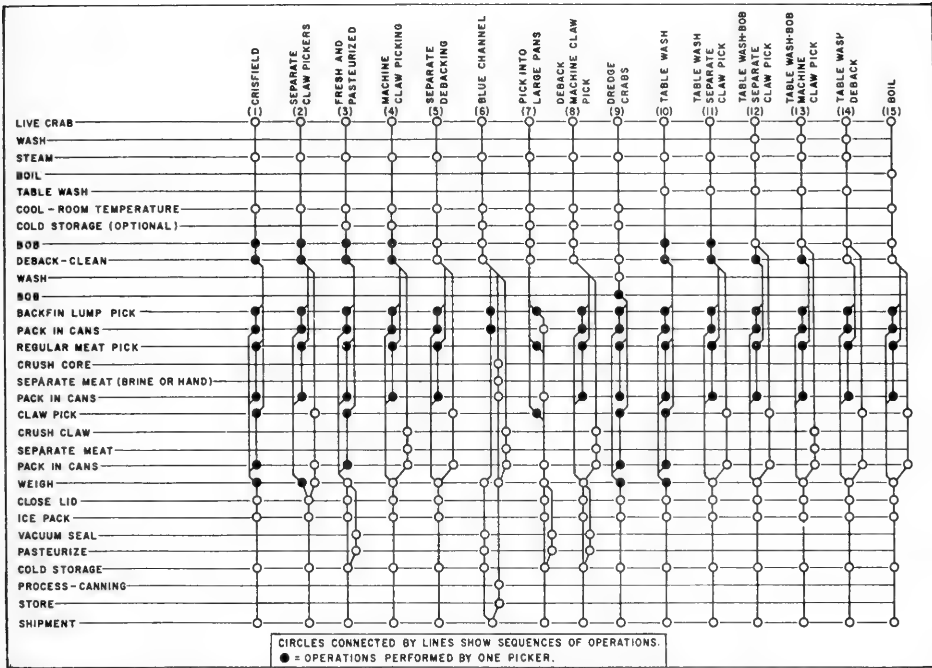


Fig. 4 - Various operation sequences. This chart, developed after a survey of the blue crab industry to determine the degree of mechanization needed, shows the 15 distinct and different handling patterns of 28 possible steps between live crabs and shipped meat that were observed in 65 plants studied.

The lump meat then can be removed manually or by a second machine that can be attached to the core-preparing device. A model of the lump picker has been fabricated and successfully tested.

To ascertain the production problems and the role that the machines now being designed may play, you will find it helpful to quickly view the industry by means of figures 5-40. The photographs were taken in 1960, the year just prior to the one in which the Fair Labor Standards Act went into effect. Although some of the plants have now shut down and a few others

Fig. 5 - Shown is a crab plant in Mississippi on Biloxi Bay. With few exceptions, crab plants are located on the waterfront.

Fig. 6 - Some of the crab boats of lower Chesapeake Bay are relatively large. In most areas, however, crab fishing is a small-boat operation.

Fig. 7 - In the foreground are two of the more common types of crab boat. Many crabs are fished by one man in a boat powered with an outboard motor.

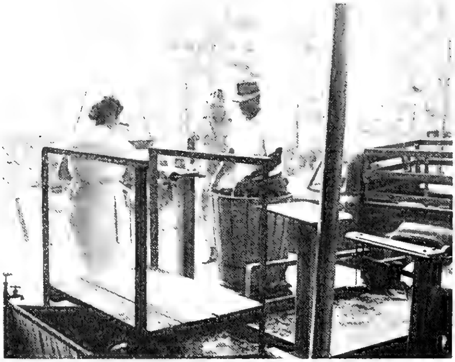


Fig. 8 - Crabs are hoisted from the boat in baskets or barrels and weighed. Crab fishermen are paid on the basis of the weight of catch. Most "crabbers" are independent, though they often have agreements to supply certain plants.

Fig. 9 - Although most plants are located on the waterfront, many of the larger plants truck crabs from other areas, sometimes hundreds of miles away, to supplement local production and to maintain a regular supply.

Fig. 10 - This plant uses circular retort baskets in which the crabs are cooked. Each basket holds 300 to 400 pounds of crabs.

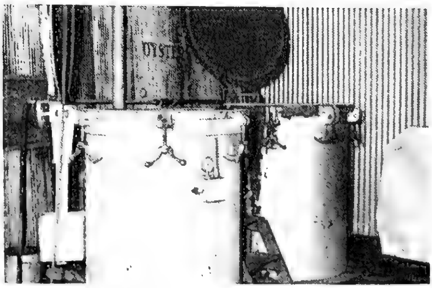


Fig. 11 - Vertical retorts for cooking the crabs are used in mos crab plants.

Fig. 12 - Other plants use horizontal pressure cookers. This cooker holds 4 of the wheeled steel-mesh carts.

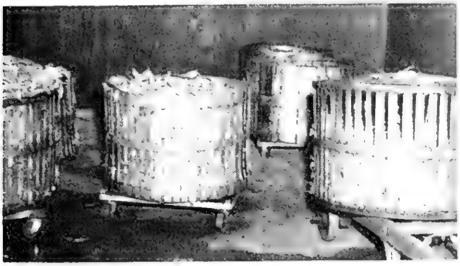


Fig. 13 - Cooked crabs are handled in many ways. Some Chesapeake Bay plants hold the baskets of crabs in a cooler overnight.

Fig. 14 - Many Gulf Coast plants deback the crabs as soon as they are cool. Here a hoist is lifting a basket until it can be tipped to dump the crabs onto the debacking table.

Fig. 15 - These workers are debacking or "bobbing" crabs. Claws are removed at the same time, as they are picked separately. The shell and viscera are discarded. Since the yield of crab meat amounts to only 12 to 15 percent of the weight of whole crab, disposing of the waste is a problem.

Fig. 16 - Many of the larger plants solve the problem of waste disposal by converting the waste into a salable product by use of a crab-scrap dryer. Waste from the debacking operation and the picking tables is dumped into the big hopper (foreground) and carried into the rotary dryer by means of a screw conveyor.

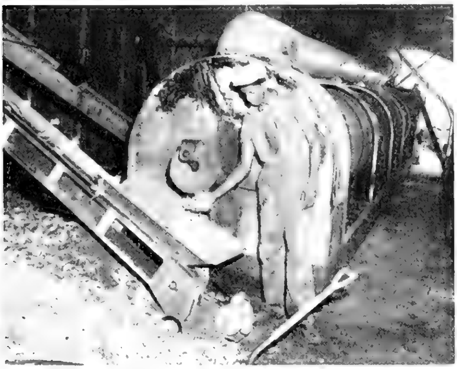


Fig. 17 - At the discharge end of another dryer, a worker is checking the scrap to determine if it is sufficiently dry for grinding.

Fig. 18 - The scrap goes from the dryer to a hammermill, where it is ground to meal and bagged. The product is used in mixed feeds for chickens.

Fig. 19 - Returning to the main plant, we see debacked crabs being washed in flowing water.

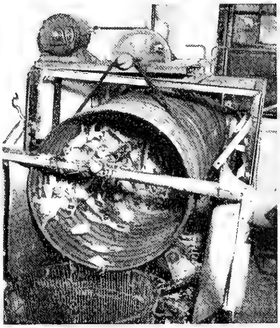


Fig. 20 - Some plants use rotary washer, for cleaning the debacked crabs.

Fig. 21 - This is a different type of rotary washer, used only for claws.

Fig. 22 - Here the debacked "cores" are washed by water sprays in an elevated flume and are transported to a basket at the end of the debacking table.

Fig. 23 - This is a crab-picking room after the daily cleanup. The cans are for the disposal of waste. In the Chesapeake Bay Area, crabs are usually cooked in the afternoon and cooled overnight. Pickers start work about daybreak.

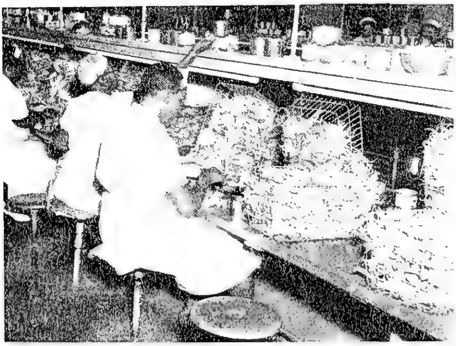


Fig. 24 - Pickers work from baskets of crabs in this plant.

Fig. 25 - Picking blue crab is almost entirely a hand operation and requires a large force of skilled workers.

Fig. 26 - The cartilage is cut and the meat picked out with a special knife.

Fig. 27 - These pickers are working on claws, which are picked separately, since the technique is quite different from that for picking body meat.

Fig. 28 - This is a patented crab-picking machine sometimes known as a claw cracker. The screw-conveyor elevates the claws to the hopper of a special type of hammermill. The broken pieces fall into a separation tank from which the meat floats off to an inspection-conveyor belt at the left. A U.S. Department of the Interior fishery inspector is observing the operation.

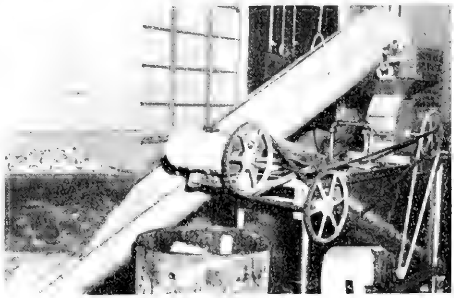


Fig. 29 - The shell fragments sink and are carried from the bottom of the tank by a conveyor belt, center foreground, from which they fall into a waste barrel. At left is the hopper heaped with crab claws feeding the screw-conveyor to the mill.

Fig. 30 - Workers check the machine-picked meat for residual shell. Note the gallon cans for packing. The product packed in gallon cans rarely reaches the retail market--it is used in mixtures such as deviled crab and crab cakes.

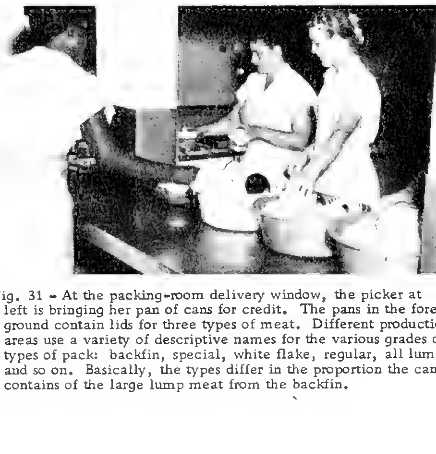


Fig. 31 - At the packing-room delivery window, the picker at left is bringing her pan of cans for credit. The pans in the foreground contain lids for three types of meat. Different production areas use a variety of descriptive names for the various grades or types of pack: backfin, special, white flake, regular, all lump, and so on. Basically, the types differ in the proportion the can contains of the large lump meat from the backfin.

Fig. 32 - This plant uses wheeled bins to ice and hold the packed meat after the weight has been checked and the cans capped.

Fig. 33 - Wooden barrels are commonly used to ship the fresh crab meat, well packed in ice.

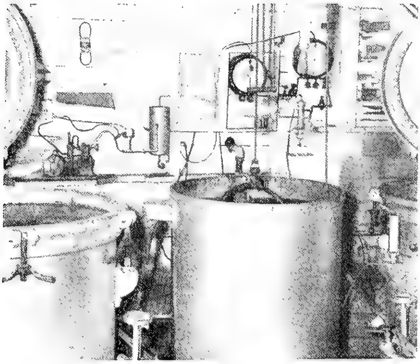


Fig. 34 - A sizable proportion of freshly picked crab meat is pasteurized and, for this process, must be packed in hermetically sealed cans. The sealed cans are placed in a steel autoclave basket and lowered into the open cooking tank. Gauges on the rear wall record the cooking time and temperature.

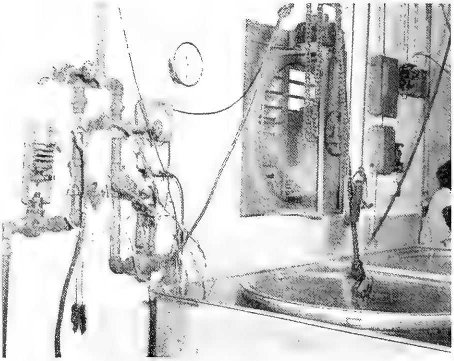


Fig. 35 - Time and temperature used in pasteurization must be carefully controlled to obtain desired keeping qualities without overcooking.

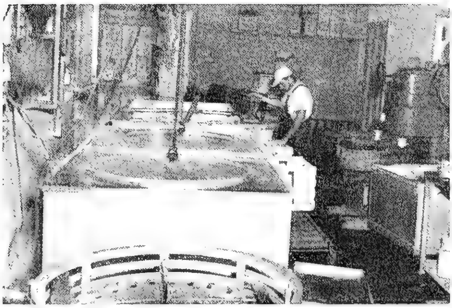


Fig. 36 - Open tanks can be used, since pasteurization temperatures are below boiling. Tanks in background are used to cool the cans of pasteurized meat.

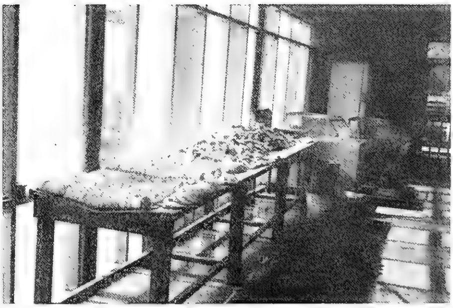


Fig. 37 - The natural shell used by many producers of deviled crab comes from the regular picking operations. After being cleaned, the shells are laid on a table in the sun to dry.

Fig. 38 - Frozen "specialty products" containing crab meat are rapidly gaining in popularity. In the preparation of deviled crab, the crab mixture is molded into the natural shell and frozen before breading and packaging. This worker is removing the frozen crab product from the freezer tray.

Fig. 39 - The frozen shell-with-deviled-crab-mix is hand dipped in batter and breading and then is packed into boxes.

Fig. 40 - The institutional size box holds 12 to 18 crabs. Packing the crab in the natural shell results in an attractive product.

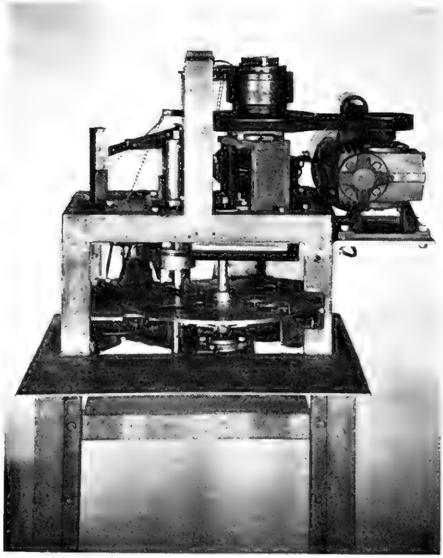


Fig. 41 - This small machine developed for the blue crab industry under contract with a research and development company will, when perfected, take whole cooked crabs and prepare cleaned cores ready for removal of lump meat at the rate of about 1 per second. The guards and the delivery and discharge chutes have been removed so that the working mechanism is open to view.

have made changes to increase efficiency of operation, this series of photographs is still quite typical of the industry in the early months of 1964.

Figure 41 shows the cleaning-debacking, core-preparing machine with guards, delivery, and discharge chutes removed so that the working mechanism is open to view. The contractor has expressed his belief that this machine, combined with the lump picker previously mentioned, will enable every plant to operate profitably even with a $1.25 hourly wage minimum.

LITERATURE CITED

LEE, CHARLES F.; GEORGE M. KNOBL, Jr.; and EMMETT F. DEADY
1963a. Mechanizing the Blue Crab Industry. Part I - Survey of Processing Plants. Commercial Fisheries Review, vol. 25, no. 7, pp. 1-10. (Sep. No. 680.)

LEE, CHARLES F.; GEORGE M. KNOBL, Jr.; ROBERT K. ABERNETHY; and EMMETT F. DEADY
1963b. Mechanizing the Blue Crab Industry. Part II - Measures for Immediate Relief Through Worker Specialization. Commercial Fisheries Review, vol. 25, no 8, pp. 1-5. (Sep. No. 683.)

LEE, CHARLES F.; GEORGE M. KNOBL, Jr.; and EMMETT F. DEADY
1964. Mechanizing the Blue Crab Industry. Part III - Strengthening the Industry's Economic Position. Commercial Fisheries Review, vol. 26, no. 1, pp. 1-7. (Sep. No. 698.)

Note: Acknowledgments: We gratefully acknowledge the cooperation of the following individuals in permitting us to take the photographs depicting the industry: Mrs. L. Walls, Bagille's Seafood, Incorporated, French Market, New Orleans, La.; Joseph Marsalone, J. Marsalone Company, French Market, New Orleans, La.; A. C. Gollott, C. F. Gollott Seafood Company, Biloxi, Miss.; M. Betty, Southern Crab Company, Pascagoula, Miss.; Sam Lewis, Brunswick Quick Freezer, Incorporated, Brunswick, Ga.; W. Lewis and E. Lewis, Lewis Crab Factory, Brunswick, Ga.; J. T. Miller, Blue Channel Corporation, Port Royal, S. C.; D. P. Elliott, G. T. Elliott, Incorporated, Hampton, Va.; Emmett Deady, American Scientific Corporation, Alexandria, Va.

IMPORTANT NOTICE

Due to an unexpected mix-up in the mailing of the June 1964 issue of the magazine, there are probably a number of subscribers who did not receive that issue. If you are one of those who did not receive that issue, write us for a copy.

REVIEW OF THE MOVEMENT OF ALBACORE TUNA OFF THE PACIFIC COAST IN 1963

By Glenn A. Flittner*

ABSTRACT

Troll catches by U. S. Navy radar picket vessels monitoring fixed, continuously-manned stations off the Pacific coast revealed the seasonal movement of albacore tuna (Thunnus alalunga Bonnaterre) in 1963. Inshore and northward migration of albacore in relation to sea surface temperatures is reviewed. Onset, termination of fishing at each station, and similarity of movement to the schematic migration model presented last year for 1962 is examined.

INTRODUCTION

In furtherance of the cooperative trolling program which was started in 1960, the U. S. Navy continued to log albacore catches in 1963 at each of its radar early warning surveillance stations off the west coast of the United States. As before, coverage extended from latitude 31° N. to 50° N. at a distance of 200-550 miles from shore. Stations were continuously manned by a fleet of several vessels participating in a rotation schedule placing each ship on a given station for 20- to 30-day intervals. (For a brief description of equipment used and general fishing strategy, see Flittner 1961 and Johnson 1960.)

Fishing commenced on April 1 and terminated November 1. When catch records indicated that a late-season flurry of activity might take place at the southern stations, vessels were asked to continue fishing through the months of November and December.

Table 1 - Date of First Albacore Catch and Water Temperature at U. S. Navy Radar Picket Stations, 1960-1963

Station Number and Year	Approximate Position		Date of First Catch	Water Temperature (°F)
	Latitude	Longitude		
1				
1960	49°N.	129°W.	(none caught)	-
1961	47°N.	130°W.	August 13	60
1962	50°N.	134°W.	August 6	62
1963	50°N.	136°W.	July 23	55
2				
1960	45°N.	130°W.	July 15	60
1961	43°N.	130°W.	July 7	63
1962	45°N.	135°W.	August 7	63
1963	46°N.	135°W.	July 23	58
3				
1960	40°N.	129°W.	July 10	58
1961	40°N.	133°W.	June 29	59
1962	42°N.	129°W.	July 6	59
1963	41°N.	134°W.	June 16	62
4				
1960	36°N.	128°W.	June 14	65
1961	35°N.	132°W.	June 17	64
1962	40°N.	133°W.	June 17	59
1963	36°N.	132°W.	July 17	65
5				
1960	32°N.	124°W.	June 5	62
1961	32°N.	124°W.	June 8	64
1962	35°N.	132°W.	June 11	59
1963	31°N.	129°W.	July 25	64
1/6				
1960	2/x	x	x	-
1961	x	x	x	-
1962	30°N.	128°W.	July 19	64
1963	36°N.	124°W.	July 23	64

1/Fishing intermittent during season.
2/X - Station not fished.

RESULTS

The 1963 catch was the highest for any one year since inception of the program. A total of 1,041 albacore was taken by the picket fleet. The estimated weight of that catch was about 10,858 pounds, or 5.4 tons.

The first catch of the 1963 season was reported at Station 3 on June 16 (table 1, fig. 1). The appearance of albacore at that station was about 2 weeks earlier than in previous years. Fishing continued with few interruptions through the season, and the last catch was logged on October 4. Water temperatures ranged from 61°-62° F. at the beginning to 68°-69° F. at the termination of fishing. Albacore appeared at Station 4 on July 17, about 4 weeks later than a year prior, and were first taken at Station 5 on July 25, more than 6 weeks later than in 1962[1/]. Stations 1 and 2 recorded their first catches of the year on July 23. Water temperatures at those locations ranged from 55°-58° F. at the commencement of fishing to a maximum of 64°-65° F. at the end of September.

*Fishery Biologist (Research), Biological Laboratory, U. S. Bureau of Commercial Fisheries, San Diego, Calif.

1/Comparisons are drawn with 1962 ship stations nearest to present stations, but 1962 locations, having the same numbers may differ from current positions by as much as 150 miles.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 719

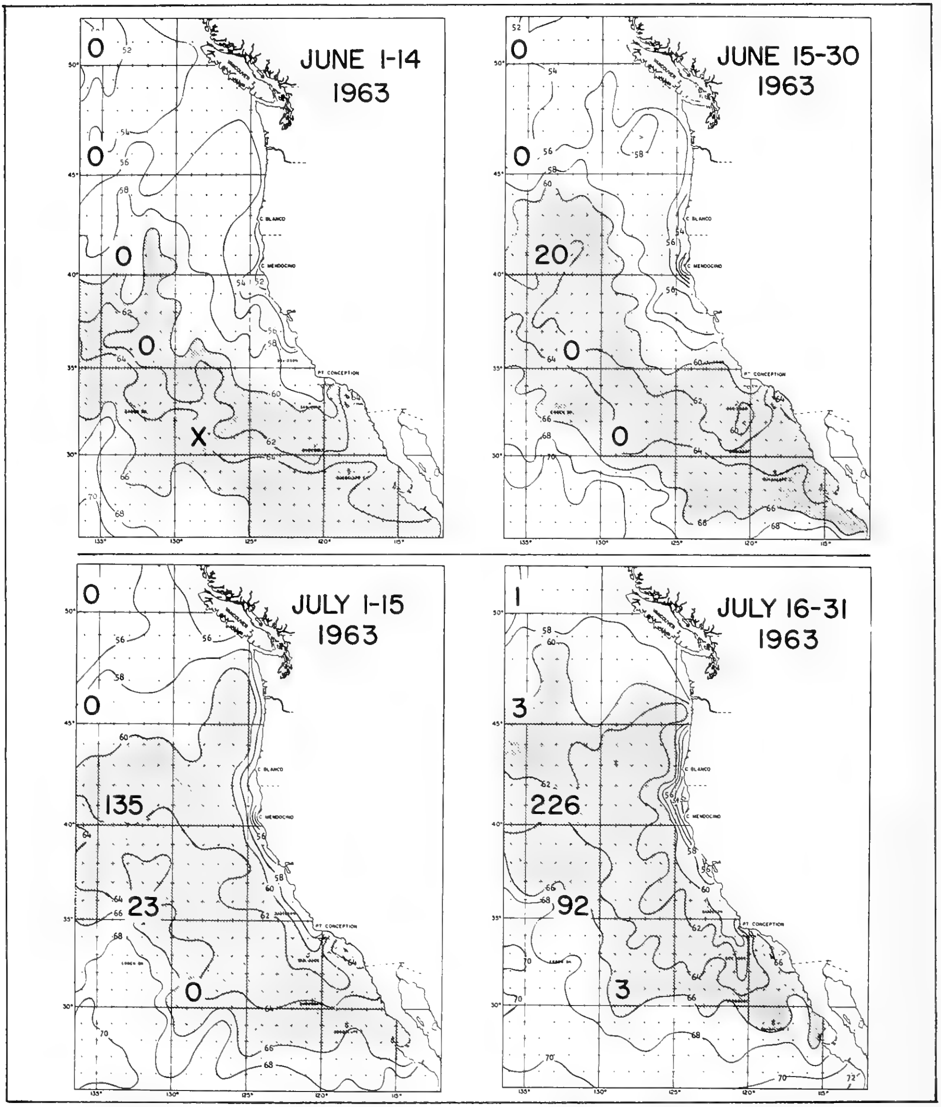


Fig. 1 - Albacore catch by U. S. Navy radar picket vessels in June-July 1963. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60°-66° F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within those temperature limits.

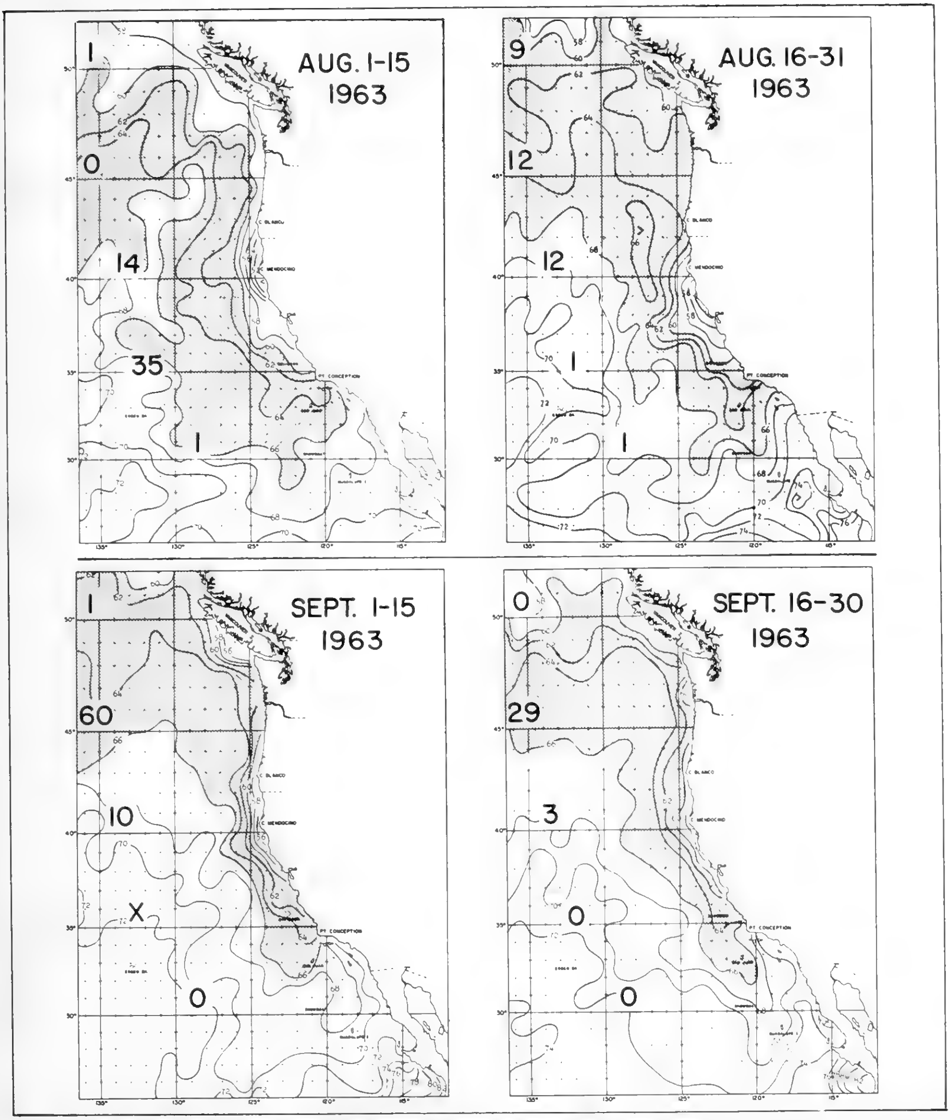


Fig. 2 - Albacore catch by U. S. Navy radar picket vessels in August-September 1962. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60°-66° F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within those temperature limits.

The Oregon albacore trolling fleet first reported taking albacore on July 13, about 140 miles west of Heceta Head. Those catches were about 200 miles northeast of Station 3, substantiating indications from the early catches at that station that the northern extension of the albacore fishery was indeed as much as 2-3 weeks earlier than usual. Subsequently, Pacific Northwest albacore landings amounted to 11,868,978 pounds, which represented the largest catch since 1948, with the exception of 1959 when 13,542,804 pounds were taken[2].

Water temperatures at Stations 1 and 2 averaged about 2° F. warmer than the long-term average at commencement of fishing in late July (Renner 1963a). As the season progressed, the anomaly increased to 4° F. warmer than normal for September (Renner 1963b). Fishing nearly equalled the 1962 catch at Station 1 and exceeded all previous years at Station 2.

The northward progression of the albacore population and its apparent relation to the annual northward extension of the 60°-66° F. thermal zone has been discussed for the years 1960 through 1963 in an earlier issue of this publication (Flittner 1963). This relationship was substantiated again by the catch-temperature distribution during the 1963 season (figs. 1-3). The shaded "optimum temperature" zone shows the rapid changes in sea surface isotherm configurations at 15-day intervals. The 60°-66° F. temperature range, which included more than two-thirds of the 1954-1958 commercial California albacore landings (Clemens 1961), encompassed fully 84.5 percent of the 1963 picket vessel catch. No albacore were taken from waters colder than 55° F. or warmer than 70° F.

The October 1-15 catch records at Stations 1 and 2 (fig. 3) appear to depart from the "optimum temperature" hypothesis given above. A plausible explanation for those catches is as follows: sea temperatures at Station 1 averaged up to 4° F. warmer than normal in Sep-

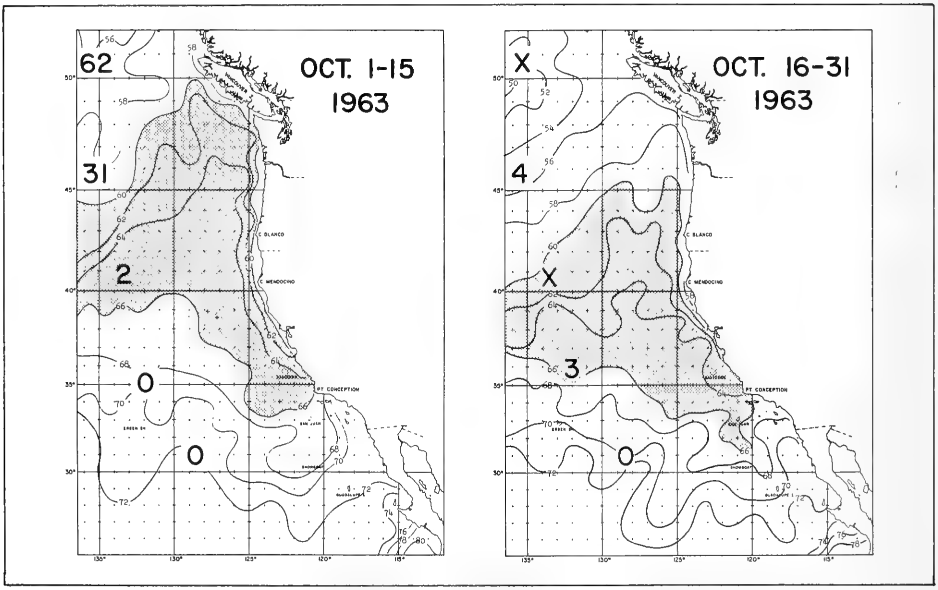


Fig. 3 - Albacore catch by U. S. Navy radar picket vessels in October 1963. Large numerals represent the catch at each station; small numerals indicate water temperature; and "x" indicates no fishing during the period. Shaded area delimits the 60°-66° F. temperature zone. More than two-thirds of the 1954-1958 California commercial albacore landings for June-September were taken from waters within those temperature limits.

[2] Pacific Fisherman Yearbook, 1964.

tember (Renner 1963b), whereas they were 3° F. colder than normal just 1 month later (Renner 1963c). The sharp 7-degree drop in sea surface temperature anomaly occurred in less than 30 days at more than two times the normal rate of cooling characteristic of the region at that time of the year. The vessel fishing on Station 1 reported having to stop all fishing operations on October 15 as a result of heavy weather from an intense storm system which had developed in the Gulf of Alaska. The upper mixed layer of the sea lost heat so rapidly as the storm system intensified that the schools of albacore probably were unable to move out of the region fast enough to avoid the suboptimal thermal conditions which were observed. Those changes are reflected in the 15-day charts (fig. 3).

Station 3 off Cape Mendocino again logged the highest total catch for the year. That area has produced 47 percent of the combined 1960-1963 catch for all stations. Catches were made on 32 of 46 consecutive days from June 16-July 31 in 1963 (table 2). Fishing was also good at Station 2 where catches were logged on 35 of 45 consecutive days between September 1 and October 15, thus establishing a new record for the area. Fishing was poorest at Station 5, where only 5 albacore were taken on 5 separate days during the entire season.

Table 2 - Albacore Catch and Effort Data for U.S. Navy Radar Picket Vessels Trolling on Station, June-October 1963

Station and item	Period										Totals
	June		July		August		September		October		
	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	
1											
Number of fish	1/ 0	1/ 0	0	1	1	9	1	1/ 0	62	2/ x	74
Number of days fish were taken	0	0	0	1	1	2	1	0	12	x	17
Line-hours fished	18	32	448	512	737	861	168	108	589	x	3,473
Catch per 100 line hours	0.0	0.0	0.0	0.2	0.1	1.0	0.6	0.0	10.5	x	2.1
2											
Number of fish	1/ 0	0	0	3	1/ 0	12	60	29	31	4	139
Number of days fish were taken	0	0	0	2	0	6	14	9	12	4	47
Line-hours fished	0.0	424	304	256	0	1,221	2,321	513	1,116	456	6,611
Catch per 100 line hours	0	0.0	0.0	1.2	0.0	1.0	2.6	5.7	2.8	0.9	2.1
3											
Number of fish	0	20	135	226	1/ 14	1/ 12	10	3	1/ 2	2/ x	422
Number of days fish were taken	0	7	10	15	3	3	3	1	2	x	44
Line-hours fished	368	714	814	787	44	114	860	944	184	x	4,829
Catch per 100 line hours	0.0	2.8	16.6	28.7	31.8	10.5	1.2	0.3	1.1	x	8.7
4											
Number of fish	0	1/ 0	23	92	35	1/ 1	2/ x	1/ 0	0	3	154
Number of days fish were taken	0	0	6	14	11	1	x	0	0	1	37
Line-hours fished	930	192	424	1,054	910	437	x	84	2,696	1,273	8,000
Catch per 100 line hours	0.0	0.0	5.4	8.7	3.8	0.2	x	0.0	0.0	0.2	1.9
5											
Number of fish	1/ 0	0	0	3	1	1	0	0	1/ 0	0	5
Number of days fish were taken	0	0	0	3	1	1	0	0	0	0	5
Line-hours fished	18	564	577	763	814	649	1,198	612	138	600	5,933
Catch per 100 line hours	0.0	0.0	0.0	0.4	0.1	0.2	0.0	0.0	0.0	0.0	0.1
Totals											
Number of fish	0	20	158	325	51	35	71	32	95	7	794
Number of days fish were taken	0	7	16	35	16	13	18	10	26	5	150
Line-hours fished	1,334	1,926	2,567	3,372	2,505	3,282	4,547	2,261	4,723	1,729	28,846
Catch per 100 line hours	0.0	1.0	6.2	9.6	2.0	1.1	1.6	1.4	2.0	0.4	2.8

1/Station fished intermittently during period.
2/X - Station not fished.

Total fishing effort expended by the picket vessel fleet for June 1-October 31 amounted to 28,846 line hours, or about 8 percent less than in 1962 (table 2). Effort varied according to the individual vessels on station, weather, and operational commitments requiring temporary interruption of fishing. Consequently, although Station 3 was again the high producer for the season, total effort expended was less than that on Stations 4, 2, and 5, respectively (table 2). The seasonal average catch per 100 line-hours at Station 3 was 8.7 fish, whereas in 1962 the average for the same station was 6.6 fish. In both years, the average catch per 100 line-hours at Station 3 has exceeded the average combined catch of all stations by a factor of 3.

Although the peak of the commercial fishing activity occurred in September, the highest catches were recorded by Navy vessels during the July 16-31 interval (table 2). Catch per

100 line-hours averaged 9.6 fish. Highest catch rates were attained at Station 3, where during the July 16-31 period, 28.7 albacore were landed per 100 line-hours of trolling; 31.8 fish were taken per 100 line-hours in the August 1-15 interval[3/].

As in previous years, catch-effort data were tabulated for all stations up to October 31 in accordance with the original fishing time limit (April 1-October 31) set up at the inception of the trolling program in 1960. When the 1963 season appeared to persist much later than usual, the vessels occupying Stations 4 and 5 were asked to continue fishing. Those vessels were able to fish well into December before heavy weather swept away their trolling gear.

Evidence of late-season activity was noted in 1962 at 40° N., 133° W. where 16 albacore from 7-11 pounds were taken November 1 through 10. In 1963, 247 albacore were taken at Station 4 (36° N., 131° W.) between November 1 and December 17. Catches reached a peak in the November 1-15 interval and declined thereafter (table 3). The vessel on Station 4 reported losing an additional 40 albacore because of inclement weather and heavy seas between November 1 and 8. Station 5 produced no catch.

Table 3 - Albacore Catch and Effort Data for U.S. Navy Radar Picket Vessels Trolling on Station 4 during November and December 1963

Item	November		December		Totals
	1-15	16-30	1-15	16-31	
Number of fish	194	40	11	1/ 2	247
Number of days fish were taken	14	14	6	1	35
Line-hours fished	1,111	718	374	44	2,247
Catch per 100 line hours	17.5	5.6	2.9	4.5	11.0

1/ Station not fished entire period due to loss of fishing gear.

One noteworthy feature of the late-season catch is that for the second year the picket vessels apparently observed the offshore migration of the albacore population. Heavy commercial landings of small fish were reported at Monterey and Morro Bay during the week ending October 25. Catches declined in the November 1-15 interval, and bad weather terminated the fishery in the week ending November 22, coincident with the increased catches observed at Station 4.

The modal length of the November-December catch at Station 4 was 59 centimeters (23.2 inches, 9.5 pounds). No fish larger than 64 centimeters (25.2 inches, 12 pounds) were taken. Eight albacore were less than 40 centimeters long; the smallest, a 32-centimeter fish (12.6 inches, about $1\frac{3}{4}$ pounds), was caught November 22 in 68°-F. water.

Comparison of albacore movements in 1963 to last year's generalized schematic model of migration (Flittner 1963) demonstrated close agreement on the broad scale. Albacore entered the coastal region and turned north about 3 weeks earlier than in the preceding 3 years, whereas migration into southern waters was up to 6 weeks later than usual. Onshore and northward movements appeared to follow the model and were limited by the distribution of "optimum" sea temperatures. The development of a good nearshore fishery in Central California and Oregon waters came early in July (fig. 1) and persisted through October as favorable sea temperatures developed in a narrow north-south zone well within reach of the albacore fishing fleet (figs. 2-3).

U.S.S. Picket carried off the honors in total catch for the second consecutive year: 360 albacore were landed of a grand total of 1,041 fish for all vessels combined; of that total, 357 were taken on Station 5 in a single patrol (fig. 4). U. S. S. Scanner was second highest vessel with a total catch of 284 albacore. Picket logged the highest catch in one day at Station 5 on July 19 when 52 albacore were taken; 46 had been caught on the previous day. Scanner landed 42 fish on November 12 at Station 7, and took 33 albacore 2 days later.

3/Although the effort expended on the station was minimal during this time, fishing occurred at intervals throughout the entire 15-day period. Fish were taken on each day the lines were out.

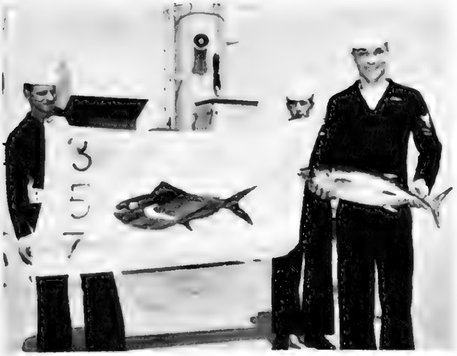


Fig. 4 - Men of the U.S.S. Picket display a sample of their record catch made on a single patrol at Station 5.

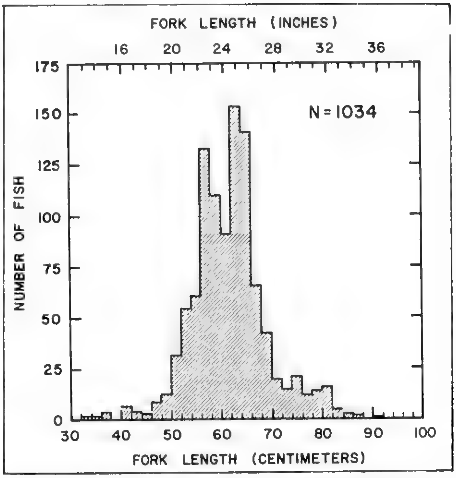


Fig. 5 - Length-frequency distribution of albacore taken by U. S. Navy radar picket vessels trolling on station, June-December, 1963. All stations combined.

Age-group representation of the 1963 picket vessel catch was similar to 1962. The 22-inch group (56 cm.) comprised 42 percent of the catch, whereas the 25-inch group (62-64 cm.) made up about 48 percent of the total (fig. 5). The remainder of the catch consisted of very small fish (about 2 percent) and fish 30 inches or longer (about 8 percent). The largest fish taken was a 36-inch, 34-pound albacore which was caught on July 23 at Station 1.

For the fourth consecutive year, distribution and availability of albacore off the U.S. west coast exhibited a striking correlation with prevailing sea surface temperatures as revealed by the 15-day charts prepared by the Biological Laboratory, San Diego. The rapid northward progression of the "optimum temperature" zone with the advance of each summer season offers substantial evidence concerning one of the factors bringing about the rapid seasonal shifting of the centers of albacore abundance.

LITERATURE CITED

CLEMENS, HAROLD B.
1961. The Migration, Age, and Growth of the Pacific Albacore (Thunnus germo), 1951-1958. Calif. Dept. Fish and Game, Fish Bull. No. 115, pp. 1-128.

FLITTNER, GLENN A.
1961. Cooperative Trolling Program, 1961. California Fishery Market News Monthly Summary, December 1961; Part II - Fishing Information, pp. 1-8.

1963. Review of the 1962 Seasonal Movement of Albacore Tuna Off the Pacific Coast of the United States. Commercial Fisheries Review, vol. 25, no. 4 (April), pp. 7-13.

JOHNSON, JAMES H.
1960. Navy Vessels Catch 447 Albacore in 1960. California Fishery Market News Monthly Summary, February 1961; Part II - Fishing Information, pp. 2-6.

PACIFIC FISHERMAN
1964. Yearbook Number. Pacific Fisherman, vol. 62, no. 2 (January 25, 1964), pp. 76-79.

RENNER, JAMES A.
1963a. California Fishery Market News Monthly Summary, July 1963; Part II - Fishing Information, 4 pp., 6 figs.

1963b. California Fishery Market News Monthly Summary, September 1963; Part II - Fishing Information, 2 pp., 6 figs.

1963c. California Fishery Market News Monthly Summary, October 1963; Part II - Fishing Information, 2 pp., 6 figs.

Note: Personnel of Radar Picket Squadron One are again to be congratulated for their participation in a cooperative program which has proven its worth to fishery scientists and to the albacore fishing industry, and has provided recreation to the picket vessel crew members. Tuna research workers and albacore fishermen alike are grateful to the officers and men of the squadron for their continued and enthusiastic participation in the trolling program.

TRENDS AND DEVELOPMENTS

Salmon

ABERNATHY SPAWNING CHANNEL PROVES EFFECTIVE FOR REPRODUCTION OF CHUM SALMON:

Manmade spawning channels are being developed as a method of reducing the 90 percent or more loss of salmon eggs that normally occurs during incubation stages in natural stream gravel. These severe losses are primarily caused by flood water that may erode incubating eggs from the gravel or smother the eggs by depositing silt and sand on gravel beds. Discovery of these limitations to salmon production has led to an attempt to create a controlled environment with graded permeable gravel and regulated flow of water with depths and velocity that would be optimum for the spawning and incubation of salmon. Not only has survival proven superior to that from natural streams under those conditions, but it is believed that the fry produced are as viable as fry produced in natural streams. This ability to compete and survive in the natural environment should result in good adult returns.

Egg-to-fry survivals in established spawning channels are exceeding survivals in natural streams by a significant margin and in some cases have reached maximum levels of over 90 percent. Because of their recent development, a reliable measure of adult returns has not been obtained for most spawning channels. Figures, however, are available from the Jones Creek channel in British Columbia where returning adult pink salmon have progressively increased from 400 to 5,000 in four generations.

Results in the Abernathy spawning channel are also encouraging. This 1,800-foot long channel (see figure), located on a tributary of the lower Columbia River, was constructed in 1959 by the U.S. Bureau of Commercial Fisheries. Method for operating the channel to achieve maximum production of young salmon and returning adults are now being developed.

The Abernathy spawning channel.

With one exception, the environment created in the Abernathy channel has been adequate for the successful incubation of chum salmon eggs. Deposition of sediment from the water supply as it moved through the channel has made it difficult to maintain the original permeable condition of the streambed gravel. Removing and screening the gravel in the channel provided a temporary solution to this problem. A more permanent solution will be attained with a settling basin which will remove silt and sand from the water supply before it enters the channel. With control of the sediment, the Abernathy spawning channel shows promise of providing conditions for achieving good egg-to-fry survival.

Survival studies at Abernathy are being conducted mainly with plants of eyed eggs, but some information has also been obtained with plants of green eggs and with natural spawning. Excellent survival (75-95 percent)

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 720

Chum Salmon Egg-to-Fry Survival in the Abernathy Spawning Channel				
Type of Deposition	Year	Number of Eggs Deposited	Number of Fry Produced	Percentage Survival
Plants of eyed eggs	1960/61	250,000	229,610	91.8
	1961/62	600,000	572,895	95.5
	1962/63	1,185,000	891,849	75.3
Plants of green eggs	1962/63	27,860	24,461	87.8
Natural spawning	1962/63	54,156	44,452	82.1

was observed for all three methods of egg deposition (see table). These consistent results have demonstrated that the Abernathy channel will yield maximum survival of chum salmon fry. With the development of an adult run adequate in size to fully utilize the facilities at Abernathy, such a channel can make a significant contribution to the chum salmon population of the Columbia River.

--Richard Bakkala, Fishery Biologist (Research),
Biological Laboratory,
U. S. Bureau of Commercial Fisheries,
Seattle, Wash.

Design and Operation of a Tray Rack for the Study of Oysters

As a result of the serious oyster mortalities which occurred along the east coast of the United States since 1957, the U. S. Bureau of Commercial Fisheries initiated a study of these mortalities at its Franklin City Field Station on Chincoteague Bay, Va. A major portion of this research involved maintaining oysters of several age groups from various geographic regions for routine observation over a period of 5 to 7 years. To prevent destruction by predators and smothering from silt and algae, it appeared desirable to support the oysters off the bottom in trays suspended from a permanent platform readily accessible to the laboratory. This report describes the design and operation of the structure, which we have called a tray rack.

The rack (fig. 1) was erected adjoining an existing pier. Creosote-treated pilings 30 feet in length were driven 12 feet into the bottom to form the supporting frame of the structure. The walks, superstructure, and braces were made of 4 x 6 and 2 x 8-inch creosote-treated lumber. The structure consists

Fig. 1 - Overall view of tray rack showing construction of walks and position of superstructure.

of six catwalks, 3 feet wide and 26 feet long, fastened to stringers which in turn are attached to vertical pilings. The walks stand 4 feet above a mean low water depth of 5 feet and border five bays 26 feet in length and 11 feet wide. Each bay holds 16 trays, each tray being suspended from the walk by a single line and bridle. Twelve additional trays could be suspended from the outside of the two outer walks making it possible to accommodate a total of 92 trays.

A block and tackle, which travels on a monorail suspended from the overhead structure,

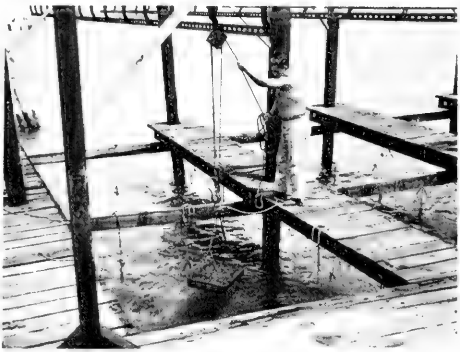


Fig. 2 - Photograph of monorails, movable block and tackle, and chicken wire cover arrangement of bridle on tray.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 721

is used to lift the trays out of the water and to transport them to the pier (fig. 2). The monorail tracking system is of the type used in the meat-packing industry. The tackle consists of a double and a single four-inch steel block swivel mounted and strung with $\frac{5}{8}$-inch rope. The superstructure rises 8 feet above the walks and adjoining pier and projects over the pier so that trays may be loaded on a flatbed handtruck for transport into the laboratory. The tracks and other metal parts are painted with "Esso Surett Fluid 30" to lubricate and prevent rusting.

The first trays employed in this study were constructed of woven steel rods, and were 40 inches long, 20 inches wide, and 4 inches deep. Later those were replaced with lighter trays of approximately the same size constructed of expanded steel welded to steel rods. To reduce corrosion the trays are dipped in hot roofing tar once or twice a year. Chicken wire ($1\frac{1}{2}$-inch mesh, 18 gauge) is used to cover the trays to prevent loss of oysters. Bridles on the trays are constructed of $\frac{3}{16}$-inch welded link chain fastened with lap links or "S" hooks. It was found that the less expensive ungalvanized chain showed no more corrosion or wear than galvanized, and "S" hooks showed less wear than the more expensive lap links. Polypropylene ropes of $\frac{3}{8}$-inch diameter are attached to the tray bridles and secured to cleats on the sides of the walks. This synthetic rope is not destroyed by marine bacteria in sea water and is thus preferable to rope made from hemp and similar natural fibers. Water from a gasoline motor-driven pump is used occasionally to flush off the soft fouling organisms and sediment which accumulates freely on oyster trays in turbid water in Chincoteague Bay.

As designed, the tray rack makes it possible for one man to handle the trays with a minimum of effort and little chance of accident. In addition, trays are easily lifted with the tackle and carted indoors for observation and study, an advantage of particular benefit in the winter in temperate latitudes. In Chincoteague Bay fouling by sessile organisms accumulates rapidly. A tray of oysters so fouled can weigh in excess of 300 pounds yet can still be handled by the system here described.

After a year of operation, we find this tray rack functional, efficient, and timesaving.

--By Michael Castagna [1/],
Fishery Biologist (Research),
Biological Laboratory,
U. S. Bureau of Commercial Fisheries,
Oxford, Md.
(Franklin City, Va., Field Station).

1/Present address: Michael Castagna, Scientist-in-Charge, Eastern Shore Marine Laboratory of the Virginia Institute of Marine Science, Wachapreague, Virginia.

Note: I wish to acknowledge the technical assistance of Paul Heister, maintenance man at the Bureau's Oxford Laboratory, in the design and construction of the structure described here.

Alaska

FOREIGN FISHING ACTIVITY OFF ALASKA:

U.S.S.R.: Soviet trawling activity off the coast of Alaska declined gradually throughout September. By the end of that month the fleet had decreased to less than 25 vessels. That fleet had been fishing from southwest Kodiak east to the vicinity of Ocean Cape off Yakutat. It appeared that the Soviets were continuing to fish for Pacific ocean perch, with little take of incidental species.

Two Soviet whaling fleets continued to operate off Alaska throughout September. One fleet worked south from the vicinity of the Pribilof Islands to south of Unimak Pass. The second fleet was whaling along the western Aleutian Chain generally in the vicinity of Amchitka Pass.

Japan: The Japanese fisheries off Alaska also declined in September as various fleets filled their catch quotas and sailed for their home ports. Two fish-meal fleets departed for Japan as the month drew to a close and both king crab fleets departed Bristol Bay about the middle of the month.

Two Japanese shrimp fleets continued to operate north of the Pribilof Islands group. The one remaining fish-meal fleet fishing in the same general vicinity was scheduled to depart shortly. A fish-meal-freezer factoryship fishing south of the Pribilofs was also expected to cease operations in the near future.

Four large new Japanese stern trawlers and two smaller side trawlers continued fishing for shrimp and Pacific ocean perch in the vicinity of southwest Kodiak Island in the Gulf of Alaska during September.

* * * * *

ALASKA SALMON PACK IN 1964:

The final 1964 weekly salmon pack report of the Alaska Department of Fish and Game

Fig. 1 - Longshoremen guiding a slingful of cases of canned salmon shipped from Alaska at a dock in Seattle.

showed the Alaska salmon pack at 3,509,400 standard cases (48 1-lb. cans). This was an increase of 853,391 cases or 32 percent as compared with the 1963 salmon pack of 2,656,009 cases.

Fig. 2 - Inside a warehouse at Seattle, Wash., labelers unpack cans of unlabeled Alaska salmon onto a conveyor for labeling.

Central Alaska, with a total of 1,721,000 cases was the highest producer, while Southeastern and Western Alaska packed 1,225,300 cases and 563,100 cases, respectively. The Kodiak area was the highest in the State with 633,250 cases. The Ketchikan area was second with 580,000 cases, and Bristol Bay was third with 535,450 cases.

Pink salmon accounted for 1,903,000 cases or 54 percent of the total pack followed by red, 720,300 cases or 21 percent; chum, 689,000 cases or 20 percent; coho or silver, 155,300 cases or 4 percent; and king, 41,800 cases or 1 percent.

* * * * *

HALIBUT FISHING SEASON IN AREA 2 CLOSES:

The 1964 North Pacific halibut fishing season in Area 2 closed on September 15 and for the second straight year the catch quota was not attained. Regulations of the International Pacific Halibut Commission provided that halibut fishing in Area 2 (from Cape Spencer, Alaska, to Willapa Bay, Wash.) would close on that date or earlier if 25 million pounds of halibut were taken. A total halibut catch of 21 million pounds was expected by the time fishing stopped on statutory closing date. Last year (1963) was the first year since the Commission assumed control of the halibut fishery that the Area 2 season closed without attainment of the catch quota (28 million pounds in 1963). The catch in Area 2 totaled 25 million pounds in 1963.

* * * * *

GEAR MARKING EXPERIMENTS:

In conjunction with United States efforts to minimize gear conflicts in the Gulf of Alaska between domestic and foreign vessels, tests of gear-marking devices for possible use in the king crab fishery were conducted aboard the U. S. Bureau of Commercial Fisheries research vessel *John R. Manning* in the Kodiak Island vicinity. Four different types of passive radar reflectors, in combination with 2 flotation devices and 3 different poles, were tested. A variety of weather and sea conditions during the period provided the opportunity for observation of the markers in situations comparable to those which might reasonably be expected in actual use with the commercial fishery.

The results of preliminary tests were encouraging. Two of the reflectors gave prom-

ising results under all sea conditions encountered during the tests. Maximum distances at which the reflectors could be observed, using shipboard radar, were $4\frac{1}{4}$ miles under "good" weather conditions and $2\frac{3}{4}$ miles under adverse conditions.

Plans were to alter the most promising reflector buoys with the goal of increasing the effective range, and subsequently to assist certain key fishermen in testing and evaluating the markers under operational conditions.

* * * * *

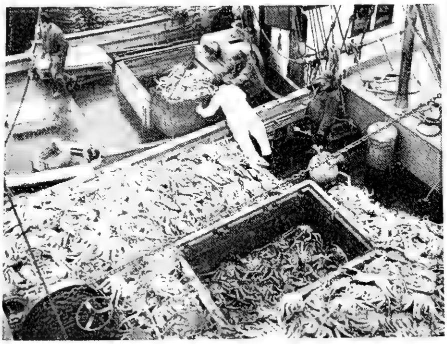
SOUTHEAST ALASKA HERRING CATCH MODERATE:

The commercial herring reduction fishery ceased operations in early September 1964, after what the industry termed a "moderately successful" season. Only 23,500 tons of a 35,000-ton herring catch quota were taken. The catch was composed of about 50 percent age VI fish and 11 percent age VII fish. No younger age classes seemed strong at the time.

* * * * *

KING CRAB LANDINGS LOW AT KODIAK:

Returns of king crab tagged by the U. S. Bureau of Commercial Fisheries in its studies near Kodiak were few, as of the end of September 1964, and indicated a lower fishing effort than in 1963. This is because full king crab processing had not yet been re-established in Kodiak since the earthquake. On the Peninsula, however, processing was reported to be in high gear and another large annual pack was anticipated.



A full load of king crabs at Kodiak, Alaska.

Alaska Fisheries Explorations and Gear Development

CHARTER OF VESSEL "PARAGON" TERMINATED:

With the completion of Cruise 64-2 (June 16-September 19, 1964) in the Gulf of Alaska and Bering Sea, the exploratory fishing vessel *Paragon*, chartered by the U. S. Bureau of Commercial Fisheries, terminated over 4 months of charter to the Bureau. The results of explorations by that vessel will allow for more detailed evaluation of the Gulf of Alaska shrimp resource.

Note: See *Commercial Fisheries Review*, November 1964 p. 17.

Alaska Fishery Investigations

SOCKEYE FRY AVAILABILITY LOW DURING SUMMER:

Widely separated studies involving summer sampling in Coville Lake with tow nets and a roundhaul seine in Auke Lake showed July-September declines in sockeye fry availability of 90 percent in Coville and 70 percent in Auke Lake for 1964. The Coville study also shows that for both 1963 and 1964 there were probably heavy mortalities of sockeye fry in early June, a stable period of low mortality in mid-summer, and another period of high mortality in late August.

* * * * *

NEW ADULT PINK SALMON RUN TRANSPORTED INTO SASHIN CREEK:

A vessel equipped with tanks for live fish was used to transport adult pink salmon from Bear Harbor, Kuiu Island, to Sashin Creek, Little Port Walter. A total of 1,866 pink salmon (including 1,139 females) were released above the weir and 150 males were released below the weir. Those released below the weir were divided into 3 groups of 50 each. One group, tagged with red Petersen discs, was released from the floating pound in Little Port Walter Bay. The second group, tagged with white discs, was released below the weir without being held in Sashin Creek. The third group, tagged with yellow discs, was held in Sashin Creek 4 days and released below the weir. About 40 of the 150 tagged fish passed upstream through the weir.

The largest number passing upstream originated from the group held 4 days in Sashin

Enumerating pink salmon fry on their outmigration at Sashin Creek, Little Port Walter, Southeastern Alaska.

Creek, and the smallest number from the group released in the bay.

There was no evidence of fish dying unspawned, and spawning occurred through the 0.6-mile length of spawning ground. Spawning density was highest in the lower 0.4-mile section, however. The transplant study was conducted cooperatively with Alaska Department of Fish and Game biologists and a privately-owned packer vessel. The results may demonstrate a feasible technique for increasing salmon production in Alaska.

American Fisheries Advisory Committee

RECOMMENDATIONS MADE AT MEETING IN NEW ENGLAND:

At a three-day meeting held in Danvers, Mass., this October (1964), the American Fisheries Advisory Committee recommended that greater emphasis be placed on programs of research and management of fishery resources, improving product quality, and development of new fishery products. It also suggested that a training program be started for commercial fishermen as a means of encouraging young people to enter the fishing industry. The Committee, which is responsible for advising the Secretary of the Interior on general fishery matters, made a number of other major recommendations.

Another recommendation by the Committee urged continuation of efforts to resolve differences between sport fishing and commercial fishing interests in both fresh-water and salt-water fisheries resources. The Committee pointed out that both groups face common problems, and solutions will require concerted efforts by both.

Other actions taken by the Committee were:

1. Endorsed provisions of the Fishing Fleet Improvement Act which calls for new fishing vessels to be of advance design, and that economic injury to existing fleets be avoided insofar as possible.

2. Recommended that the fishing industry and the Federal Government take full advantage of the Federal fisheries legislation enacted in the 88th Congress.

3. Endorsed the new Commercial Fisheries Research and Development Act as a means of providing maximum opportunities for further development of commercial fisheries at state levels.

At the meeting, representatives from the U. S. Bureau of Commercial Fisheries discussed programs of the North Atlantic Region. Highlights included the Bureau's research on quality of fresh and frozen fish; new and more efficient fishing vessels and gear; and biological and oceanographic programs seeking improved knowledge of fisheries resources. Other matters discussed included the problem of heavy fishing pressure by foreign fleets off the New England coast; the recently passed Fishing Fleet Improvement Act; and economic factors affecting the New England fishing industry.

The Advisory Committee visited the new and recently dedicated Marine Products Irradiator at Gloucester, Mass. This facility (which was constructed by the Atomic Energy Commission) will be operated by personnel of the U. S. Bureau of Commercial Fisheries, and is the first food irradiation plant in the world devoted entirely to fishery products. Members of the Committee also toured major fish processing plants in the Gloucester area.

The next meeting of the American Fisheries Advisory Committee will be held in Washington, D. C., in the spring of 1965.

American Samoa

TUNA FLEET AS OF AUGUST 31, 1964:

A total of 33 tuna fishing vessels was reported to be fishing out of American Samoa as of August 31, 1964. They consisted of vessels from the following countries: Japan--20; Taiwan (Formosa)--7; Republic of South Korea--5; and Okinawa--1. An additional six 140-ton class tuna vessels from South Korea were expected to join the Samoan fleet after October 10. The six vessels were constructed in Japan. (Suisan Keizai Shimbun, September 26, 1964.)

Aquatic Weeds

USE OF GRASS CARP FROM MALAYSIA TO FIGHT WATER VEGETATION IN PONDS: A species of fish known as grass carp found in Malaysia is reported to be almost completely herbivorous, preferring a diet of grass and other water vegetation rather than subsisting on insects and competing fish. The U. S. Department of the Interior announced this past September that 27 small specimens of these grass carp were imported into the United States from Malaysia in 1963 for propagation experiments and study of their feeding habits. They are being studied at experimental ponds managed by the Bureau of Sport Fisheries and Wildlife at Stuttgart, Ark. If their propagation in this country is successful, they may eventually be the means to help fight vegetation in the thousands of farm ponds where production of game fish is restricted by excessive weed growth.

In selecting this carp, scientists point out that excessive vegetation in farm ponds provides too much escape cover for small fish, which are the main source of food for larger fish. Heavy weed growth also impedes navigation and the harvest of desirable fish species. Herbicides could be used to eliminate weeds, but that approach is considered too costly and also might prove hazardous to fish. For those reasons it was decided to experiment with the test group of imported grass carp.

The Bureau says it has much to learn about the species before it would recommend its use in the United States. Even if the grass carp proves its worth at keeping vegetation out of test ponds, its ability to reproduce will be studied in carefully controlled experiments. The Bureau also wishes to know the effects the grass carp would have on other species of fish and on desirable waterfowl foods.

The Chief of the Fish Farming Experimental Station at Stuttgart said Malaysian fishery scientists report they have been unable to spawn grass carp in ponds there. He believes spawning might be induced by adding fresh water to the test ponds and by injecting hormones, if necessary. He said, "Up until 15 years ago it was believed impossible to spawn our native buffalofish in ponds, but the introduction of fresh water into ponds resulted in successful spawning." Fishery scientists are not sure why the introduction of fresh water will help induce spawning. Some think it may give the fish confidence that there will be an adequate water supply for the survival of their young.

The 27 specimens of grass carp at Stuttgart are the survivors of 70 fingerlings sent to the experiment station by air in plastic bags last year by the Malaysian Director of Fisheries.

The fingerlings, then less than an inch long, survived their trip and were divided among indoor aquaria and an outdoor pond. They were fed fish meal and canned spinach during the winter. About half the indoor group survived; only one in the outdoor pond was lost. The survivors are now about 16 inches long and weigh about two pounds each. They are fed high-protein fish meal, supplemented occasionally with a handful of grass.

The grass carp has smaller scales and a more elongated body than its cousin, the German carp, which was imported and introduced to the United States nearly a century ago as a food fish, but is not thought of very highly by sport fishermen. The German carp reproduces rapidly, muddies water, and retards the growth of plants needed for oxygen replenishment of water and competes for food with some species more desired by sportsmen. If the grass carp begins displaying any of those traits, it will be rejected by the Stuttgart researchers. The grass carp is said to be active and might be a good game fish. As far as is now known, it does not feed on other fish.

A report from England said 15,000 grass carp are being used successfully to prevent weeds from clogging water inlets at an electric power station at Barrow-in-Furness. British scientists have not yet learned if the fish will spawn there.

California

PETRALE SOLE MIGRATION STUDIES AND TAGGING: M/V "N. B. Scofield" Cruise 64-S-4-Bottomfish (July 21-August 20, 1964): To locate and tag petrale sole (*Eopsetta jordani*) for migration and subpopulation studies was the principal objective of this cruise in the coastal waters off Shelter Cove, Bodega Bay, and Ventura, by the California Department of

Fish and Game research vessel N. B. Scofield. Secondary objectives were to tag sharks in cooperation with the American Institute of Biological Sciences and the U. S. Fish and Wildlife tagging program, and to collect specimens for specific studies.

All tagging on this cruise was conducted in the vicinities of Shelter Cove and Bodega Bay using commercial otter trawl gear. A total of 2,864 petrale sole was tagged and released in water shallower than 65 fathoms. The fish were caught during 95 tows, each of which lasted from 20 to 30 minutes. The condition of the fish taken from and released in shallow water was excellent.

A total of 43 tows was made in the Shelter Cove area and yielded 1,664 petrale sole for tagging. About 60 percent of those fish were of commercial size (greater than 11 inches), and were available in commercial quantity. The remaining 52 tows were made in the Bodega Bay area where 1,200 petrale were tagged. Although 99 percent of the Bodega Bay fish were of commercial size, they were less abundant than in the Shelter Cove area.

Returns from this tagging effort will give valuable information about summer migrations of petrale sole stocks, as well as additional growth data. A few tagged petrale sole were recaptured by the commercial fishing fleet before the cruise ended.

Five male dogfish shark (Squalus acanthius) were tagged and released in the Shelter Cove area. Two red Peterson disc-type tags printed in English and Spanish were secured on either side of the first dorsal fin with a stainless steel pin.

Specimens of English sole (Parophrys vetulus), petrale sole (Eopsetta jordani), Dover sole (Microstomus pacificus), rex sole, Glyptocephalus zachirus), and curl-fin turbot (Pleuronichthys decurrens) were collected for systematic studies at the California Academy of Sciences.

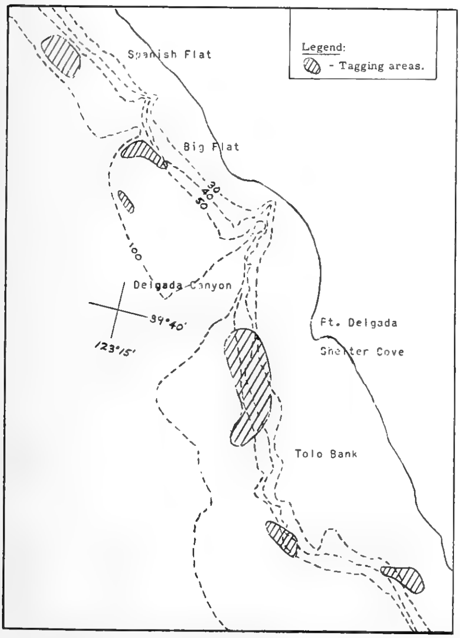


Fig. 1 - Shows Shelter Cove tagging area, N. B. Scofield Cruise 64-S-4-Bottomfish (July 21-August 20, 1964).

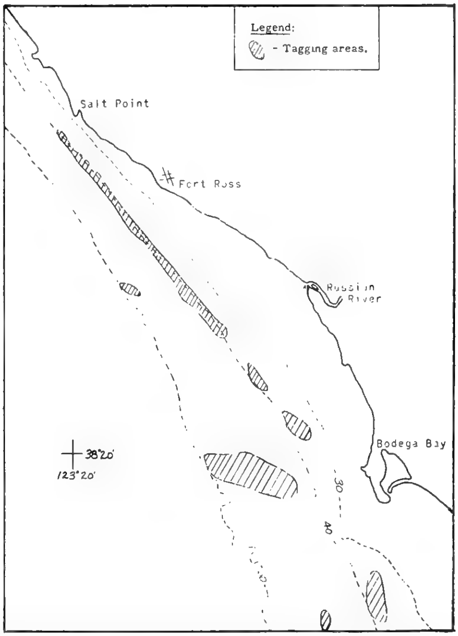


Fig. 2 - Shows Bodega Bay tagging area, N. B. Scofield Cruise 64-S-4-Bottomfish (July 21-August 20, 1964).

It had been planned to tag Pacific halibut (Hippoglossus stenolepis) with operculum tags but none were caught during the cruise. The halibut tagging project is in cooperation with the International Pacific Halibut Commission.

Three tows were made in the Ventura area to collect juvenile California halibut (Paralichthys californicus) for the California Department of Fish and Game's sportfish project at Terminal Island, but none was caught.

Note: See Commercial Fisheries Review, February 1963 p. 20.

* * * * *

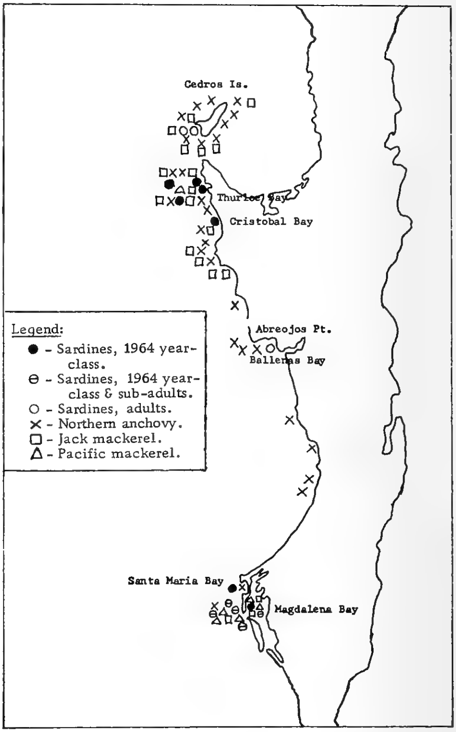
PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 64-A-5-Pelagic Fish (July 28-August 18, 1964): The objectives of this cruise by the California Department of Fish and Game research vessel Alaska in the coastal waters of southern Baja California, Mexico, from Magdalena Bay to Cedros Island were to: (1) survey the pelagic species to determine population densities and to ascertain age and size compositions; (2) assess sardine spawning success for the current year (1964); and (3) collect live anchovies and groupers for blood genetic studies by the U.S. Bureau of Commercial Fisheries Biological Laboratory, La Jolla, Calif.

A large midwater trawl and a blanket net were used as sampling devices. Both types of gear were fished over the same general areas; the trawl on 36 stations and the blanket net on 24. All work was conducted at night, with a bright electric light used to attract fish for capture with the blanket net.

NORTHERN ANCHOVY (Engraulis mordax): Northern anchovies were the dominant species throughout the survey area. They were taken in 24 midwater trawls in numbers ranging from several fish up to 26,000. Visual scouting between stations accounted for 68 schools and 25.5 miles of surface scatter in the 237 miles scouted. (Surface scatter consisted of fish spread sparsely through the top 3 to 4 feet of water, and which were in sight continuously for distances up to several miles.)

Blanket-net stations were ineffective in sampling anchovies due to the negative phototactic reaction of that species to the attracting light. They appeared under the light on 4 stations but remained so deep that only one small sample was obtained.



Alaska Cruise 64-A-5-Pelagic Fish (July 28-August 18, 1964).

Magdalena and Santa Maria Bays contained large amounts of juvenile anchovies 60 to 80 millimeters (2.4 to 3.1 inches) long. They were massed in thick continuous schools along much of the shoreline. Concentrations of adults were present off Abreojos Point and smaller subadults were taken in Cristobal Bay and at Cedros Island. Except for the large amounts of juveniles in the southern part of the area surveyed, anchovy abundance appeared to be at about the same level as the previous year.

PACIFIC SARDINE (Sardinops caeruleus): Pacific sardines were taken at 8 blanket-net stations and in 6 midwater trawl tows. Magdalena and Santa Maria Bays yielded the most fish, accounting for 5 blanket-net and 2 trawl catches. Other catches were made in Bol-

lenas Bay, Cristobal Bay, Thurloe Bay, and at Cedros Island. Juvenile fish-of-the-year predominated, with adults occurring in only three catches. The juvenile sardines were found in pure schools, a change from the usual mixture of a few young sardines in a large school of anchovies. No schools were sighted during night scouting. The 1964 year-class appears to be stronger than those of the preceding 2 years.

PACIFIC AND JACK MACKEREL (Scomber diego and Trachurus symmetricus): Pacific mackerel were taken in quantity only in Magdalena and Santa Maria Bays, where both juveniles and adults were found. The remaining catches consisted of a few individuals of subadult size. The blanket net made 5 catches and the trawl 1. Last year's (1963) survey found Pacific mackerel distributed over a much larger area and in greater quantities.

Jack mackerel were taken mainly in the northern part of the survey area. The trawl accounted for 14 catches and the blanket net 5. The catches consisted wholly of juveniles and subadults, with a preponderance of fish-of-the-year. Those young fish were scattered throughout the upper 3 feet of water and were very vulnerable to the trawl. No schools of either mackerel species were sighted while scouting.

INVERTEBRATES: Squid and pelagic red crab (Pleuroncodes planipes) were frequently taken in the trawl. Several catches of red crab exceeded one ton.

During the cruise, live broomtail grouper (Myctoperca xenarcha) and spotted cabrilla (Epinephelus analogus) were collected for blood serology studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory, La Jolla.

Weather and sea conditions during the cruise were good and permitted completion of all planned work. Sea surface temperatures were considerably colder than normal for the time of year, especially north of Abreojos Point. Temperatures in that area ranged from 59° F. (15.0° C.) to 68° F. (20.0° C.) and averaged about 7° F. colder than during the previous year.

* * * * *

Airplane Spotting Flight 64-12-Pelagic Fish (August 10-12, 1964): To determine the inshore distribution and abundance of pelagic fish schools, the area from Bodega Bay to Port Hueneme, and Point Vicente to Oceanside, Calif., was surveyed from the air by the California Department of Fish and Game aircraft Cessna "182" N9042T.

On August 10, the area from Jalama Park to Port Hueneme and Point Vicente to Oceanside was scouted. Heavy smoke and haze limited air visibility in the areas flown and precluded surveying much of the southern California coastal area. From Ventura south, "red tide" restricted water visibility. North of Ventura, a total of 56 northern anchovy (Engraulis mordax) schools was noted very near the surf line. At San Onofre, a small school of Pacific bonito (Sarda chiliensis) was sighted on the surface feeding upon smaller unidentified organisms.

On August 12, the area from Bodega Bay to Mussel Point was scouted. Both air and water visibility were good except for a few patches of fog in the Morro Bay-Pismo Beach area.

In Monterey Bay, large concentrations of anchovies were seen near Santa Cruz and Monterey. The fish at Santa Cruz occurred in large unbroken groups; one school being an estimated 4 miles long and $\frac{1}{4}$ mile wide. Many of the schools were in the surf. Anchovy schools were also spotted in Drakes Bay, the San Francisco area, Cayucos-Morro Bay, and the Avila-Pismo Beach areas.

More fish were seen on this flight than on any other flight the past $1\frac{1}{2}$ years.

* * * * *

Airplane Spotting Flight 64-13-Pelagic Fish (September 1-3, 1964): The area from Point Arena, Mendocino County, to the United States-Mexican Border was surveyed by the aircraft Cessna "182" N9042T. Weather conditions on this flight were ideal for aerial scouting. Air visibility extended up to 50 miles at times and water clarities were generally good. Red tide and other phytoplankton blooms were found in most areas scouted but only in small, local concentrations.

On September 1, the area from Jalama Park to the United States-Mexican Border was scouted. Between Laguna Beach and the Mexican Border, 72 schools of large Pacific bonito (Sarda chiliensis) and 1 school of Cali-

fornia barracuda (Sphyraena argentea) were counted. Northern anchovies (Engraulis mordax) were quite abundant from Dana Point south where 46 schools were tallied.

On the following day, the area from Point Arena to Point Sur was scouted. An extensive school group of anchovies (98 schools) was sighted near the surf between Bolinas Bay and San Francisco; the schools were small and indistinct. The water was a light greenish-brown and turbid. Another anchovy school group (29 schools) was found along the beaches just south of San Francisco.

On the last day of the survey, the area from Santa Cruz Point to Point Vicente was scouted. In Monterey Bay, 18 breezing schools of unidentified fish were counted, all under predation by birds. Very possibly the schools were "pinhead" anchovies. During August there were many large schools of anchovies in that area. Red tide was extensive in the northern part of the bay.

Other school groups of anchovies were found in the Cayucos (23 schools), Avila (11 schools), and Port Hueneme (25 schools) areas. Red tide also was encountered in those same areas.

* * * * *

Airplane Spotting Flight 64-14-Pelagic Fish (September 15-17, 1964): The area from Punta Banda to Cabo San Lucas, Baja California, Mexico, was surveyed by the Beechcraft N5614D. This was the third of four experimental quarterly flights scheduled for 1964 along the Baja California coastline.

On September 15, the area from Laguna Scammon to Punta del Marquis was scouted. Air and water visibility was very good throughout the area scouted. Large school groups of northern anchovies (Engraulis mordax) were observed from Bahia de San Cristobal south to Bahia de la Magdalena, the majority swimming near the surf line. The schools were rather small, compact clusters. Fish schools also abounded in Bahia de la Magdalena proper. Most were anchovies, but 12 Pacific sardine (Sardinops caeruleus) schools were noted.

On September 16, the area from Cabo San Lucas to Bahia de la Magdalena was scouted. A large school group of sardines (56 individual schools) were breezing south of the Bahia and 10 miles offshore.. Many anchovy and a few sardine schools were again seen in the Bahia proper. Air and water visibility was excellent that day.

The area from Laguna Scammon to Punta Banda was scouted on the last day of the survey. Water visibility ranged from good to poor. Air visibility was reduced by low broken clouds over part of Bahia de Sebastian Vizcaino. Scouting north of Punta Banda was terminated due to a complete cloud cover. Red water was encountered at Punta Canoas, Cabo San Quintin, Cabo Colnett and Punta Banda.

Anchovy schools were seen in Bahia de Sebastian Vizcaino, near Punta Canoas, Punta Baja and Cabo San Quintin. Five sardine schools were sighted, 3 near Punta Santo Domingo and 2 southwest of Punta Canoas. Most schools of both species were again seen near the surf line.

This flight was by far the most productive, in numbers of schools seen, of the three Beachcraft N5614D flights flown this year.

Note: See Commercial Fisheries Review, November 1964 p. 24; October 1964 p. 16.

* * * * *

HATCHERY FISH LOSSES ATTRIBUTED TO FOOD PROBLEM: Something in a fish food formula apparently caused the excessive fish losses experienced at California State hatcheries during the summer of 1964. From mid-July through late September 1964, approximately 2,128,000 small fish died in California State fish-rearing installations. That was about 9 percent of the 23 million fish in the hatcheries when the problem arose.

As soon as the excessive death rate was noted, scientists began searching for the cause. The possibility of a disease outbreak was ruled out first. Then other avenues were investigated. When a change to different kinds of fish food began to bring the situation under control, fish culturists were led to believe that the original food might have been responsible.

Rainbow trout were hit hardest, with 1.7 million small fish lost from the 18.2 million rainbows on hand when the problem started. About 100,000 trout of other species also were lost. Although the loss was much heavier than

is normal for hatchery operations, the California Department of Fish and Game said it would still be able to meet 1965 trout requirements. Additional trout eggs can be taken, hatched, and reared to replace the lost fish.

King salmon, silver salmon, and steelhead trout were less severely affected. Among that group, losses because of the food problem were as follows: of 696,000 king salmon on hand, 130,000 were lost; of 1,880,000 silver salmon on hand, 13,000 were lost; and of 2,198,000 steelhead on hand, 185,000 were lost.

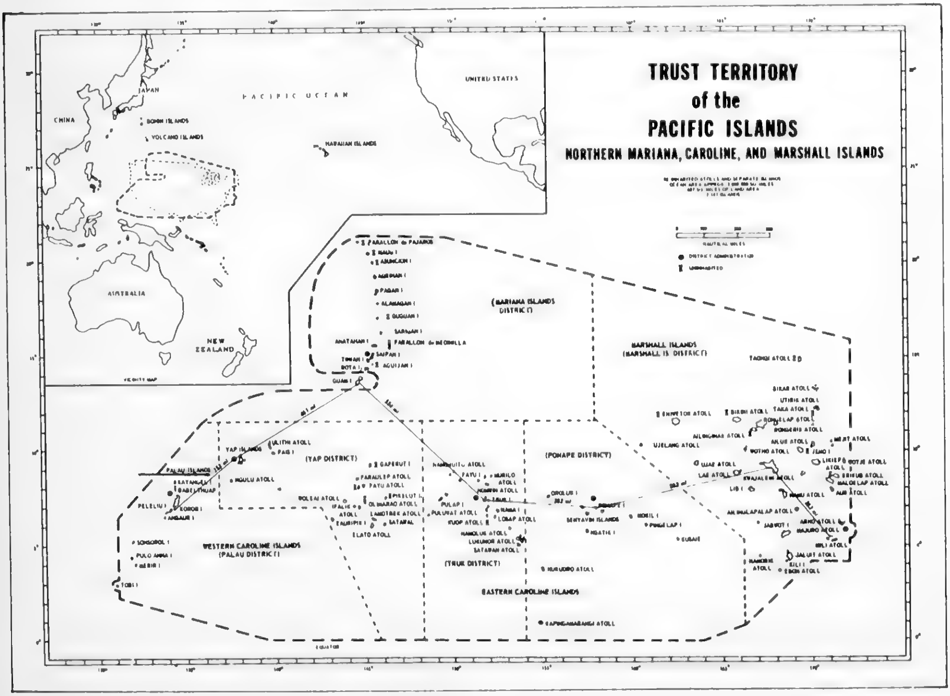
The king salmon involved were fish being raised to yearling size in an experimental program. Plants of king salmon fingerlings (totaling about 11.8 million fish) made before the food problem arose accounted for the bulk of king salmon production in California State hatcheries in 1964. Steelhead trout and silver salmon are usually planted as yearlings, although 1,512,000 steelhead were also planted as small fingerlings earlier this year.

California hatchery officials stated that although the problem seems to be under control, some further losses are anticipated due to the after effects of the food problem, particularly among king salmon. (California Department of Fish and Game, October 3, 1964.)

Caroline Islands

COMMERCIAL FISHERIES PROJECT AT PALAU BEING DEVELOPED:

A major breakthrough in commercial fisheries development in the Caroline Islands Group of the United States Trust Territory of the Pacific occurred in 1963. At that time, an agreement was signed between a California tuna-packing firm and the Trust Territory



Government for the establishment of a commercial fishery enterprise at Palau. The contract called for the development of extensive fishing operations in Palau, as well as establishing a commercial tuna-freezing plant and for the training of Micronesians ashore and at sea. Shore installations and other facilities were to be built by the United States firm with the cooperation of the Trust Territory Administation.

In its 16th Annual Report to the United Nations, the Trust Territory Administration said the opening of Palau to commercial fishing marks the first major step toward large-scale development of the most important natural resource of the Territory, and is expected in time to lead to similar enterprises in other districts. The administration reported that the Pilot Fisheries Project at Palau was in operation and that a cold-storage freezer plant had been completed. In 1964 the program to train Micronesians in live-bait tuna fishing was under way with some 25 trainees taking part in the training program on Hawaiian tuna fishing vessels.

The Administration reported that other United States tuna-packing firms also were interested in the area's commercial fishery possibilities and that representatives of those firms had made surveys in Palau, Truk, and Saipan. The Administration stated that while the quantity of frozen reef fish exported to Guam dropped somewhat during the period covered in its report, there was an appreciable increase in shipments of frozen fish to other districts in the Territory. Frozen fish exports to Guam and other districts were expected to increase materially in 1964 now that the cold-storage freezer at Palau is completed.

Note: See Commercial Fisheries Review, August 1964 p. 16; April 1964 p. 32; August 1963 p. 85.

Central Pacific Fisheries Investigations

RESULTS OF MIDWATER TRAWLING FOR JUVENILE TUNA:

M/V "Townsend Cromwell" Cruise 7 (August 10-24, 1964): One of the major problems faced by biologists engaged in studies on the life history of marine fish is the lack of data on the smaller specimens which fall under the category of juveniles. Presently, larval fish are sampled by various types of plankton nets, while data on the adults are obtained either through existing commercial fisheries or by the use of specialized fishing gear. In neither case are juveniles caught in any quantity. This lack of juveniles in the plankton catches has been attributed to the combined effects of the swiming ability of the juveniles, the towing speed of the sampling devices, and the relatively small size of the plankton nets.

Fig. 1 - Recovering the Nanaimo trawl aboard a U. S. Bureau of Commercial Fisheries research vessel in the Central Pacific.

The U. S. Bureau of Commercial Fisheries Biological Laboratory in Honolulu, Hawaii, is approaching that problem by considering the use of very large nets. This past August, sea trials (M/V Townsend Cromwell Cruise 7) were carried out to test the "Cobb" pelagic midwater trawl and the "Nanaimo" Mark IV midwater trawl as possible methods of catching juvenile tuna. Under optimum conditions, the "Cobb" trawl has a mouth opening of 80 x 80 feet, while the "Nanaimo" trawl measures 40 x 40 feet. By comparison, the plankton net in use by the Honolulu Laboratory is a ring net with a diameter of 1 meter (about 3.3 feet). In order to retain juvenile tuna less than 30

Fig. 2 - Emptying the Nanaimo trawl.

millimeters (1.2 inches) in length, the "Cobb" and "Nanaimo" trawls used in the trials were modified by adding small-mesh cod-end liners ($\frac{1}{2}$ inch stretch-mesh nylon to the "Cobb" trawl and $\frac{1}{4}$ inch square-mesh nylon to the "Nanaimo" trawl).

A preliminary analysis of the trawl catches showed that 2 juvenile skipjack tuna (Katsuwonus pelamis) were taken in 1 of the 11 hauls made with the "Cobb" trawl. With the "Nanaimo" trawl, which had slightly smaller mesh sizes than the "Cobb" trawl, a total of 12 hauls yielded 5 juvenile skipjack. The catches were made in 2 of the 12 hauls. The juveniles ranged in size from 15.0 to 25.0 millimeters (0.6 to 1.0 inches) in standard length.

The test hauls were made in the lee of the islands of Oahu and Hawaii, where skipjack are usually plentiful during the summer months. Hauls were generally made in the morning between 0700 and 1000 hours and at night between 1900 and 2200 hours. All the juvenile skipjack were taken in the morning hauls when the trawl was towed at depths between 40 and 60 fathoms. Hauls made near the surface and at depths over 70 fathoms failed to catch juvenile tunas.

During that cruise a recently acquired trawl depth indicator (the Furuno Net-Sonde) was tried. The instrument, which is activated at a depth of 25 fathoms by a pressure switch in the transducer, was operated successfully.

On several occasions, traces of what appeared to be sizable schools of fish were picked up by the SIMRAD depth recorder. No attempt was made to fish the schools because of the time limitation. Nevertheless, several important questions arise from those traces: (1) whether the traces did indeed represent schools of commercial fish, and if so, whether they were composed of bottom fish not presently being exploited commercially, (2) whether the bottom topography surrounding the islands are suitable for trawling, and (3) whether the trawlable area is large enough and fish plentiful enough to sustain trawling on a commercial scale.

Based on recent reports on trends in trawling methods, it is quite feasible to use existing types of gear to depths of 100-400 fathoms for commercial fishing. It is noteworthy that in the Hawaiian Islands, the 100- to 400-fathom area contains over 5,000 square miles; how much of that area is suitable for trawling is not yet known, but it could be considerable.

A preliminary assessment of abundance and composition of fish available to trawling is contemplated for the future by the Bureau's Honolulu Biological Laboratory and the discovery of new fishery resources would be an important economic development in island fisheries.

On this cruise the "Cobb" midwater trawl was tested off Waianae and also a series of trawl hauls were made with the "Cobb" and "Nanaimo" midwater trawls in the lee of Hawaii for biological studies. The vessel (operated by scientists of the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii) experimented in an area off Waianae, Oahu, and Kona, Hawaii.

Side trawling operations using both the "Cobb" and "Nanaimo" midwater trawls were accomplished successfully during this cruise. The "Cobb" trawl was used successfully without any modification in the gear. The "Nanaimo" trawl was modified considerably with the removal of the stabilizer fins, addition of chain along the entire length of the footrope and addition of 10 extra floats to the original 14 floats. The modified net performed better than the "Cobb" trawl due to smaller mesh size.

Out of a total of 28 hauls, 5 were made with the "Cobb" trawl in the test area off Waianae where the 2 juvenile skipjack tuna were taken in a morning haul. Eleven hauls with the same trawl off the lee of Hawaii yielded no juvenile tuna. The catches were generally less than $\frac{3}{4}$ gallon of material. Twelve hauls with the modified "Nanaimo" trawl resulted in 2 hauls catching 1 and 3 juvenile skipjack, respectively. The volume of catches generally exceeded those made with the "Cobb" trawl. All the juvenile tuna were taken in the morning hauls between the hours of 0700-0930. Both day and night surface hauls caught very few or no juvenile fish.

A trial surface tow with the 2-meter plankton net showed that this could be an excellent sampling device. The meter attached to the ring operated satisfactorily but the loose corner connections of the metal frame caused the net to collapse. This can be easily corrected by constructing a frame with rigid corners.

From the results of the trawling operations, it was concluded that it is now possible to design a net that will serve the best purpose in attaining adequate catches and in reducing the manpower required for that operation.

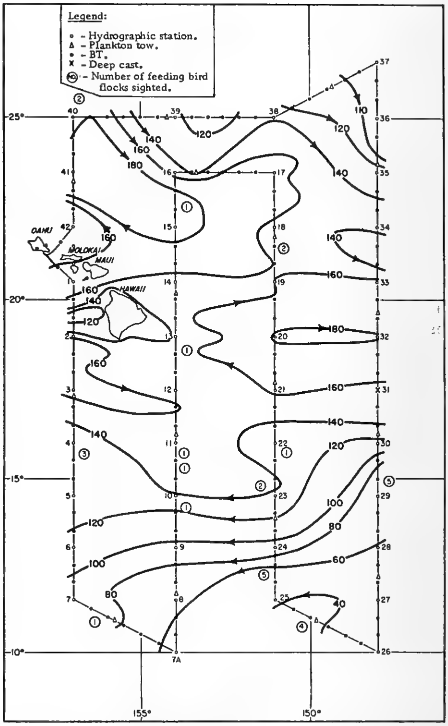
No tuna schools were sighted in the lee of Hawaii during the $1\frac{1}{2}$ weeks of trawling. This may possibly have had some bearing on the poor catches of juvenile tuna made with the trawls.

* * * * *

TRADE WIND ZONE OCEANOGRAPHIC STUDIES CONTINUED:

M/V "Townsend Cromwell" Cruise 8 (September 1-20, 1964): This was the seventh in a series of oceanographic cruises to determine rates of change in the distribution of properties in the trade wind zone of the central North Pacific. The research vessel Townsend Cromwell of the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, operated in the central North Pacific bounded by latitudes 10° N., 27° N. and longitudes 148° W., 158° W. during this cruise, which was completed September 20, 1964.

A total of 43 oceanographic stations was occupied along the cruise track. At each of the stations occupied, temperatures and samples for salinity analysis were obtained at 20 depths to 1,500 meters (4,921 feet). A deep cast to 5,000 meters (16,404 feet) was taken at station 31.



Cruise track chart of Townsend Cromwell Cruise 8 (September 1-20, 1964), showing depth contours of the 20° C. isotherm in meters.

The September surface circulation pattern did not differ markedly from the pattern seen during the month of July (Townsend Cromwell Cruise 6). During both those months, a broad region of variable flow between 15° and 23° N. latitude separated the relatively faster currents moving eastward in the northern portion and westward in the southern portion of the study area. The westerly flow, the North Equatorial Current, appeared to have increased in intensity during this cruise, as suggested by the sharper gradients of the isotherm depths. Surface temperatures in the study area ranged from 24° C. to 27° C. (75.2° F. to 80.6° F.), as before. An increase in the extent of the weak, secondary surface

thermocline was also noted throughout the region covered.

A total of 28 feeding bird flocks were sighted on this cruise as compared with 49 sightings during the July Townsend Cromwell cruise. Ten plastic-enclosed drift cards were released at 30-mile intervals along the entire cruise track during this cruise.

Note: See Commercial Fisheries Review, November 1964 p. 27

* * * * *

EARTH'S GRAVITATION MEASURED: M/V "Charles H. Gilbert" Cruise 73 (May 29-June 4, 1964): This cruise by the research vessel Charles H. Gilbert of the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, to obtain measurements of the earth's gravity, was in collaboration with the Institute of Geophysics, University of Hawaii.

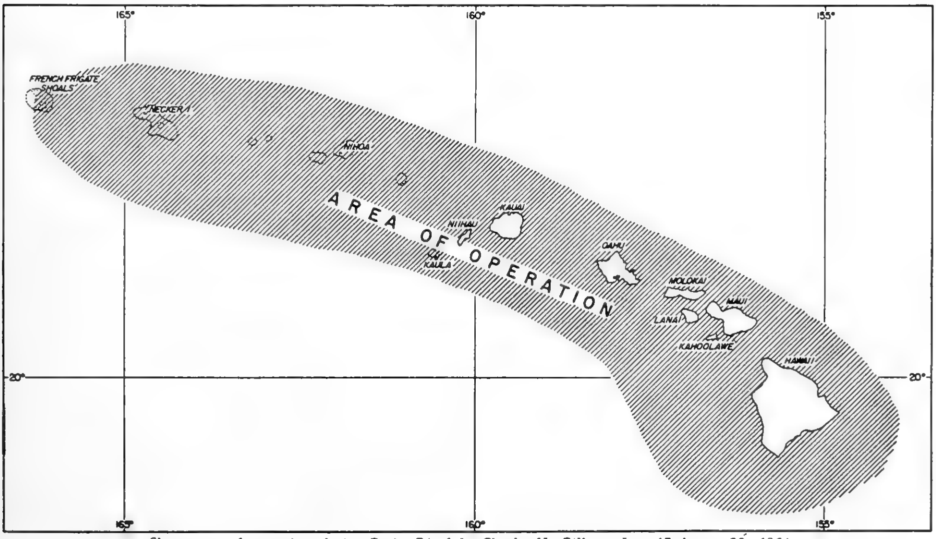
The Charles H. Gilbert made rendezvous with the University's research vessel Neptune I, and the two vessels thereafter proceeded independently. Sea conditions were unusually calm during the entire cruise, permitting some 1,000 miles of gravity observations out of about 1,170 miles total cruise. This was considered a successful cruise since there had been some question as to whether or not a sea gravimeter could operate on a small vessel.

* * * * *

TUNA BIOLOGICAL STUDIES CONTINUED: M/V "Charles H. Gilbert" Cruise 74 (June 16-August 23, 1964): Tuna biological studies and oceanographic observations were the objectives of this cruise by the research vessel Charles H. Gilbert. The area in which the research vessel operated was bounded by latitudes 18°30' N. to 23°50' N. and longitudes 154°30' W. to 166°20' W.

Successful fishing areas for skipjack tuna during this cruise included the waters from Kauai to Kaula Island, Penguin Banks, the Kona coast and Hilo on the island of Hawaii, and the banks region near the island of Nihoa. A total of 1,681 skipjack blood samples was collected from 19 schools and a standard watch for bird flocks was maintained.

During the cruise, a total of 72 bird flocks was sighted, 53 were associated with skipjack schools, 8 with mahi-mahi schools, and 11 were unidentified.



Shows area of operations during Cruise 74 of the Charles H. Gilbert, June 15-August 23, 1964.

Bathythermograph casts were taken at 3-hour intervals when practicable throughout the cruise. A water sample for salinity measurements was taken with each cast. Additional surface salinities and temperatures were taken each time a school was fished.

Drift cards were released every 3 hours during the regular BT schedule, and a standard weather watch was maintained.

A total of 155 live skipjack, 17 yellowfin, and 4 Euthynnus yaito was obtained for the Laboratory's Behavior Program studies.

Landings were made on Nihoa, Necker and various portions of French Frigate Shoals to search for drift cards but none was found.

A demonstration cruise was given by the vessel during the Hawaiian International Billfish Tournament held at Kona, Hawaii. A total of 189 skipjack was caught and 100 blood samples were taken on that cruise.

* * * * *

TUNA BEHAVIOR STUDIES CONTINUED:

M/V "Charles H. Gilbert" Cruise 75 (September 14-18, 1964): To collect and return live scombrids to the Kewalo Basin tanks of the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, where their behavior is being studied, was the primary objective of this cruise by the Laboratory's research vessel Charles H. Gilbert. Another objective was to return to Kewalo Basin for density determinations up to 10 specimens of each scombrid species caught (excluding skipjack) which died during fishing operations.

A total of 146 scombrids was caught by trolling and pole-and-line fishing during the cruise, 66 live specimens of which were placed in the behavior facility tanks. The total catch by species during this cruise was 141 skipjack tuna, 3 little tuna, 2 yellowfin, and 1 mahi-mahi. Density determination was made of one little tuna.

During the cruise, red and white muscle and blood samples were obtained from 4 skipjack for ion-metabolism studies by the Pacific Biomedical Research Center, University of Hawaii.

Note: See Commercial Fisheries Review, August 1964 p. 16; June 1964 p. 14.

Columbia River

SALMON RETURNS ENCOURAGING:

Silver: By early October 1964, more than 51,062 silver salmon had passed through the counting ladders at Bonneville Dam on the Columbia River, setting a new record for the period since 1938 when salmon counting began on the Columbia. Silver salmon usually run until mid-October so the final 1964 returns should be even greater. The previous record year was 1941 when 17,911 silvers passed Bonneville Dam.

The tremendous increase in silver salmon returns is apparently due to the improved fish hatchery program in the Columbia River and its tributaries, according to officials of the U. S. Fish and Wildlife Service. The Columbia River hatcheries are producing larger and more vigorous fingerling silver salmon which are reared to yearling size for their migration to the ocean.

The improved quality of the silvers is indicated by the 1964 commercial landings, in which the average silver salmon weighed about 10 pounds--2 pounds more than normal. Total silver salmon landings in 1964 by Columbia River commercial fishermen are expected to exceed 1 million pounds. Sport fishermen at the mouth of the Columbia also had a good year, landing many 15-pound silvers.

Since most of the natural spawning grounds for silver salmon are located below Bonneville Dam, the large return of silvers to hatcheries above the dam indicates that the Federal and State hatcheries are doing an effective job.

Fall Chinook: The escapement of fall chinook salmon through Bonneville Dam totaled 169,292 fish as of October 5, 1964. That was 30,222 more than the 1963 total of 139,070, and was the greatest number of fall chinook at Bonneville since 1959, when the count was 189,115.

The 1964 fall chinook run also provided Columbia River commercial fishermen with a good catch which is expected to exceed 3 million pounds.

An extra dividend from the heavy run was the large take of fall chinook eggs at various fish hatcheries. The 14 lower Columbia River hatcheries--both State and Federal--had a much better than average year with a total of about 111 million fall chinook eggs taken. Spring Creek National Fish Hatchery located above Bonneville Dam near Underwood, Wash.,

led all the hatcheries with 45 million eggs collected from the spawning run to the hatchery and 3 million from the run to the Big White Salmon River. Bonneville Hatchery of the Oregon Fish Commission took 15 million eggs. After hatching, the fish from those eggs will be raised at the hatcheries and released into the main river or tributary streams to start their migration to the ocean.

Spring Chinook: Good numbers of spawning spring chinook salmon--some 21 percent more than the average counted during the past 15 years--were tallied during a late survey of 5 key salmon-producing streams in eastern Oregon. The purpose of the spawning ground survey (made annually by the Oregon Fish Commission) is to determine the trend of spawning escapement to upriver tributaries of the Columbia River. During the surveys, fisheries men walk sample sections of certain streams on one occasion each year during the peak of spawning activities, counting all adult salmon encountered, both alive and dead. The total number of fish thus counted is taken as the index number for the year. That number can be compared with the numbers obtained in other years for an indication of the trend of escapement to the spawning grounds--whether up, down, or relatively stable.

The 1964 count of 1,072 spring chinook spawners on slightly less than 40 miles of index stream is among the highest since the annual surveys began in 1948. (The count represents only a portion of the total number of spawners present in the five streams, and is not intended to be a complete count of the fish present in them.)

Index spawning areas covered in the annual survey include portions of the Minam, Lostine, and Imnaha Rivers and Catherine and Lookingglass Creeks. A prespawning loss of adults resulting from a flash flood on Catherine Creek during late July reduced this year's count which otherwise would have been even more favorable.

The annual survey is only a sampling program. It does not cover many good eastern Oregon spawning streams and it does not include Idaho and eastern Washington where other good Columbia watershed chinook spawning tributaries are located.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-SEPTEMBER 1964:

Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, more fresh and frozen fishery products were purchased in September 1964 than in the previous month. The increase--40.3

Table 1 - Purchases of Principal Fresh and Frozen Fishery Products by Defense Subsistence Supply Centers, September 1964 with Comparisons

Product	September				Jan.-Sept.	
	1964		1963		1964	1963
	Quantity Pounds	Cost Cents/Pound	Quantity Pounds	Cost Cents/Pound	Quantity Pounds	Quantity Pounds
Shrimp:						
raw headless	115,100	85.2	1/	1/	970,550	1/
Peeled and deveined	197,200	99.8	1/	1/	1,060,622	1/
breaded	360,850	75.1	1/	1/	3,175,850	1/
molded and breaded	-	-	1/	1/	349,770	1/
Total shrimp	673,150	84.1	553,250	76.8	5,556,792	5,018,664
Scallops	208,060	59.6	175,457	55.5	2,311,150	2,062,107
Oysters:						
Eastern	71,732	96.1	1/	1/	629,314	1/
Pacific	43,136	64.4	1/	1/	235,072	1/
Total oysters	114,868	84.2	125,945	94.7	864,386	883,723
Clams	17,552	31.6	20,206	32.2	215,903	201,370
Fillets:						
Cod	80,300	28.6	32,836	29.3	382,466	488,685
Flounder	235,636	27.6	205,673	29.8	2,443,502	2,389,927
Haddock	235,000	30.7	143,107	37.3	1,583,854	1,666,576
Ocean perch	421,000	26.8	348,026	31.2	2,791,420	2,932,651
Haddock portions	181,650	46.8	-	-	337,464	-
Steaks:						
Halibut	143,050	43.5	171,052	38.5	1,016,127	1,108,073
Salmon	28,750	63.8	15,063	54.8	173,275	143,650
Swordfish	1,055	56.6	1,318	54.6	10,635	24,068

1/Breakdown not available.

percent in quantity and 28.2 percent in value--was due to larger purchases of scallops, oysters, and finfish products. Total shrimp purchases were about the same in both months.

Table 2 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, September 1964 with Comparisons

QUANTITY				VALUE			
Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
1964	1963	1964	1963	1964	1963	1964	1963
(1,000 Lbs.)				($1,000)			
2,665	1,853	20,078	17,673	1,464	992	10,819	9,942

Compared with the same month in the previous year, purchases in September 1964 were up 43.8 percent in quantity and 47.6 percent in value. This September there were larger purchases of shrimp, scallops, and most fish fillet items, particularly haddock fillets and portions.

Total purchases in the first 9 months of 1964 were up 13.6 percent in quantity and 8.8 percent in value. In January-September 1964 there were larger purchases of shrimp and scallops, but noticeably lower purchases of cod fillets, ocean perch fillets, and halibut steaks.

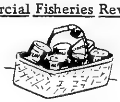
Table 3 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, September 1964 with Comparisons

Product	QUANTITY				VALUE			
	Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
	1964	1963	1964	1963	1964	1963	1964	1963
	(1,000 Lbs.)				($1,000)			
Tuna	1,066	647	4,282	2,711	452	290	1,907	1,297
Salmon	2	12	681	30	1	8	417	20
Sardine	18	43	260	375	10	15	153	150

Canned: In the first 9 months of 1964, total purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) were up 67.6 percent in quantity and 68.8 percent in value due mainly to larger purchases of tuna. Canned salmon purchases were also up, but there was a modest decline in canned sardine purchases in January-September 1964 due principally to the light 1964 season pack.

Freeze-Dried: Fishery purchases for the Armed Forces in September 1964 included 1,960 pounds of freeze-dried shrimp (cooked) with an average value of $10.49 per pound, and 540 pounds of freeze-dried shrimp (raw) with an average value of $18.48 per pound.

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than indicated because data on local purchases are not obtainable.
(2) See Commercial Fisheries Review, Nov. 1964 p. 28



Fish Hatcheries

STUDIES ON RE-USE OF HATCHERY WATER CONTINUED:

Experiments with re-use of hatchery water for salmonids (involving oyster-shell filtration and bacterial recondition) conducted by the U. S. Bureau of Sport Fisheries and Wildlife have been expanded from the highly successful circular tank model to pilot-scale raceways. An aeration tower has been constructed at the Salmon-Cultural Laboratory, Longview, Wash., the filter beds and reconditioning units were made ready, and 80 pounds of fingerling chinook salmon were introduced into each of two raceways. The oyster shell not only filters the water but also keeps the pH up, and the nitrogen-metabolizing bacteria keep ammonia concentration down. Growth of fish in the earlier tests of re-used water was exceptionally good and mortalities exceptionally low. The prospects seemed excellent for application in areas where water supplies are low.

Fisheries Laboratory

BIOLOGICAL LABORATORY AT OXFORD, MD., DEDICATED BY U.S. BUREAU OF COMMERCIAL FISHERIES

The U. S. Bureau of Commercial Fisheries held dedication ceremonies on October 17, 1964, for its Biological Laboratory at Oxford, Md. It is the Bureau's first laboratory on Chesapeake Bay.

Although the laboratory building has been occupied since 1960, dedication ceremonies were delayed pending the completion of other research facilities, including four quarter-acre artificial salt-water ponds where large-scale culture and growth studies will be carried out.

Donald L. McKernan, Director of the Bureau of Commercial Fisheries, said the Oxford Laboratory has already made valuable contributions in several scientific fields, including studies of shellfish mortality and shellfish culture. Research at the laboratory is conducted in cooperation with State authorities in New Jersey, Delaware, Maryland, and Virginia.

The Oxford Laboratory is located on a major estuary which has a salinity range from fresh to oceanic water. Chesapeake Bay is

an excellent breeding, nursery, and feeding ground for many sport and commercially important fish. In the adjacent ocean and in seaside bays are oysters, surf clams, soft and hard clams, crabs, and many fish species of recreational and commercial importance.

The Oxford Laboratory also maintains a Field Station at Chincoteague Bay, Va., where studies requiring oceanic salinity are conducted.

The largest operation at the Oxford Laboratory is the shellfish mortality program. In recent years massive oyster mortalities due to disease have virtually wiped out the oyster industry in Delaware Bay, and seriously damaged the industry in Virginia. The cause of the mortalities is as yet unknown, although there is some epidemiological evidence that indicates an organism called MSX (multinucleate sphere unknown) may be the infective agent responsible.

The laboratory staff numbers 24 (12 professional scientists and an equal number of supporting aides and technicians), with additional scientists scheduled to join the research group.

The Bureau of Commercial Fisheries operates 20 biological research laboratories located on the Atlantic, Gulf, and Pacific coasts, and in Hawaii and Alaska. Each has specific missions concentrating on important commercial species in its area.

Fishery Research

FEDERAL AID FISHERY RESEARCH AND SPECIAL STUDIES:

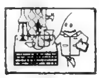
Many new Federal Aid fishery research projects were approved by the U.S. Bureau of Sport Fisheries and Wildlife this past June. Virginia and Georgia will participate in a cooperative fish disease and parasite study. Oregon will study Kokanee salmon and coastal cutthroat trout ecology. Wyoming will determine the role of three tributary streams in the natural perpetuation of cutthroat trout in the Snake River.

Tennessee will evaluate the effect of Cordell Hull Dam construction on the 7-mile-long fishery in the tail waters of the Dale Hollow Dam. Kentucky Reservoir fishing survey will be a combined study conducted by the Tennessee Valley Authority and the Kentucky and Tennessee conservation departments. Colorado will make preimpoundment investigations of the Curecanti Unit, Upper Colorado River Storage Project.

Louisiana plans an ecological survey of factors affecting fish production in a natural lake and in a river. California will investigate the effects of artificial destratification in a reservoir and measure physical and chemical changes in the water. California also will conduct environmental and behavioral studies on coastal sport fishes living in the rocky subtidal area.

Montana will undertake fisheries surveys by helicopter on 10 mountain lakes in the Bitter-root River Drainage that are inaccessible by road. New general statewide fisheries surveys were started in Oklahoma, Montana, Kansas, North Carolina, and Colorado.

Also, contracts for special studies have been signed with universities where cooperative fishery units are located: University of Maine--striped bass spawning in Maine coastal streams; Cornell University--methods for marking young fish; University of Massachusetts--life history of rock bass, Quabbin Reservoir; Pennsylvania State University--ecology of the white sucker; and North Carolina State University--variation in growth rate in bluegills. The results of those studies will be applicable to State and Federal fishery programs.



Fishing Limits

THIRD INTERNATIONAL LAW OF THE SEA CONFERENCE RECOMMENDED BY AMERICAN BAR ASSOCIATION GROUP:

A resolution concerning the width of the territorial sea and fishing limits was adopted by the House of Delegates of the American Bar Association at its annual meeting in New York City, August 12, 1964. The resolution said that the territorial sea and fishery controls should be considered as unrelated and separate problems. The resolution recommended that the American Bar Association strongly urge that the United States Government:

1. Publicly proclaim its willingness to join with other states in reaching separate agreements for:

(a) Substantial uniformity of breadth of the territorial sea for the purpose of ensuring free and unhampered navigation in, on, and over the maximum expanse of the high seas, and

(b) fishery controls for sound utilization and conservation of the living resources of the sea, including agreement upon reasonable zones for exclusive fishery rights in coastal states.

2. Take the lead in urging the United Nations to convene a Third United Nations Law of the Sea Conference at which, for the first time, the consideration of freedom of navigation, and fishery controls, as unrelated and separate problems would, hopefully, enable states to agree upon solutions to each of these problems.

3. Immediately constitute an expert study group, with political, military, industrial, scientific, and legal representation, to recommend specific solutions to each of the aforesaid problems which will both serve the individual interests of the United States and gain acceptance in the family of nations.

Fur Seals

PRICES FOR ALASKA SKINS AT FALL 1964 AUCTION:

The fall auction in 1964 (October 8-9) of United States Government-owned fur seal skins yielded \$2.36 million. The total value was slightly more than that received for the spring 1964 auction, but more skins were sold and the average price per skin was considerably lower than during the spring auction.

The average price per skin received for male fur seal skins (dyed Black, Kitovi, and Matara) was \$85.56 and for female skins (dyed Black, Kitovi, and Matara) \$64.34. At the spring 1964 auction, the average price paid for male skins was \$105.45 and for female skins \$71.16.

Lakoda (female sheared) seal skins brought an average price of \$59.65 at the fall 1964 auction, or a much higher price than the average of \$48.82 at the spring 1964 auction and \$40.63 at the fall 1963 auction. This increase is due to the intoduction of a dyed Lakoda product.

Average prices received for processed male fur seal skins by color or type at the fall 1964 auction were: Black, \$91.58, Kitovi, \$67.41, Matara, \$83.81. Average prices for both male and female dyed skins combined at the fall 1964 auction were (average for spring 1964 auction in parentheses): Black, \$84.51 (\$92.47); Kitovi, \$62.49 (\$81.66); Matara, \$75.89 (\$91.58).

Note: See Commercial Fisheries Review, June 1964 p. 15; December 1963 p. 25.

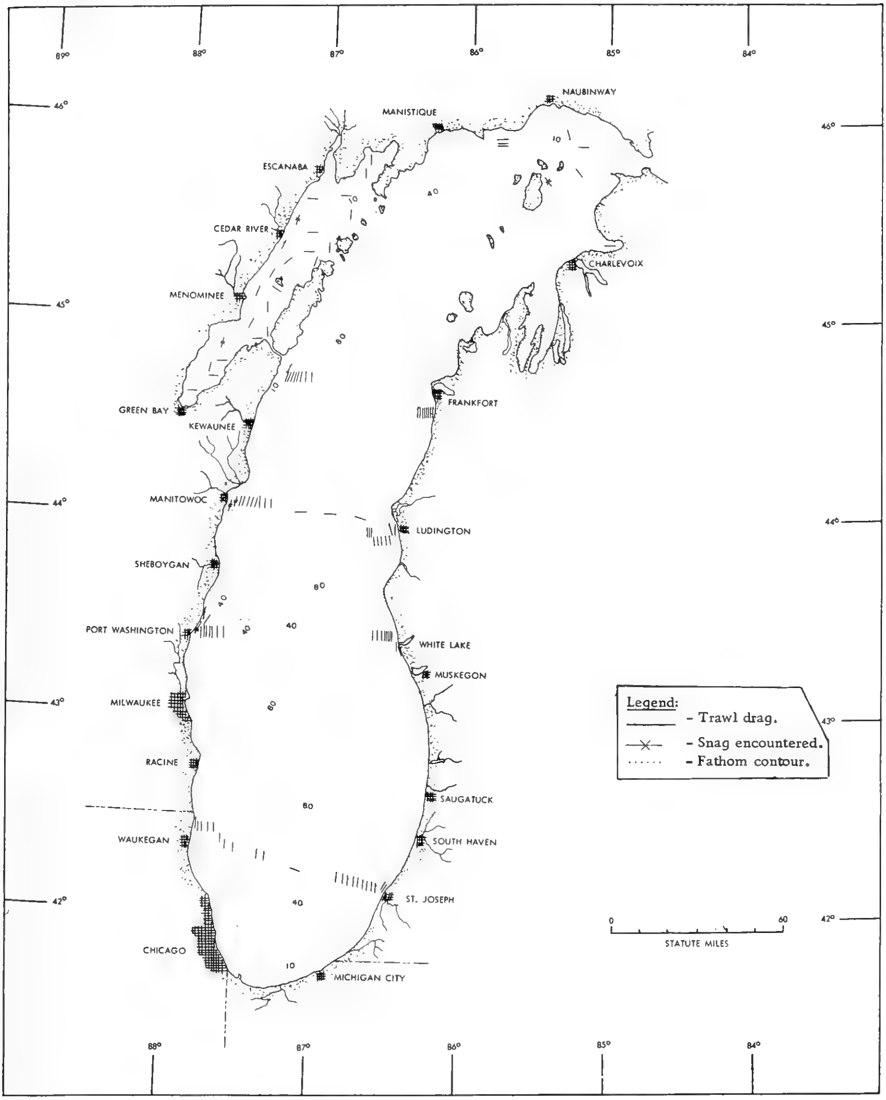
Great Lakes Fisheries Explorations and Gear Development

SEASONAL DISTRIBUTION AND ABUNDANCE STUDIES OF ALEWIFE, CHUB, AND YELLOW PERCH IN LAKE MICHIGAN CONTINUED:

M/V "Kaho" Cruise 21 (August-September 1964): To extend knowledge of the seasonal distribution and abundance of alewife and chub, in Lake Michigan and their availability to bottom trawls was the primary purpose of this 21-day cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing and gear research vessel Kaho. Special efforts were also made during the cruise to locate and determine the availability of yellow perch to bottom trawls in southern Lake Michigan. Other objectives of the cruise were to: (1) collect length-frequency data on chub, alewife, and yellow perch; (2) collect samples of various species of fish for laboratory analysis relating to special studies; and (3) obtain half a ton of chubs for animal nutrition studies at Cornell University. Cruise 21 of the Kaho was divided into several trips during August and September, partly for the benefit of observers, and was completed September 29, 1964.

The cruise marked the virtual completion of the southern Lake Michigan part of the project to study alewife and bloater chub during all phases of the year, in respect to abundance and availability. Those explorations, which required about $2\frac{1}{2}$ years to complete, have (1) verified the existence of a substantial alewife and chub resource which is only partially used and (2) established the fact that otter-trawl nets are practical for catching those species almost continuously throughout the year for animal food and fish meal manufacturers. Future operations in the southern part of Lake Michigan will be concerned with evaluating shallow-water fish stocks and with further development of more economical methods to catch such abundant species as alewife and bloater chubs.

Explorations in Green Bay and northern Lake Michigan during the cruise provided information useful for fishermen catching alewife for reduction into fish meal. Several very good catches of alewife were made in central Green Bay and in Lake Michigan off the Sturgeon Bay ship canal. The initial year-round study of those areas is only about half completed and will be continued during cruises later this year and throughout 1965.



Lake Michigan and Green Bay explorations by Kaho Cruise 21 (August-September 1964).

FISHING OPERATIONS: A total of 122 trawl drags was completed with a 52-foot (headrope) fish trawl during the cruise. Of the total drags, 24 were in Green Bay, 27 in northern Lake Michigan, and 71 in southern Lake Michigan. All drags were of 30 minutes duration, except for 9 which were terminated early because of snags or rough bottom conditions. Heavy trawl damage requiring replacement of the net was encountered at 10 fathoms off Beaver Island, at 5 fathoms off Manitowoc, and at 11 fathoms off Cedar River. Bottom topography and bathymetric distribution of fish were continuously monitored and recorded with a high-resolution echo-sounder.

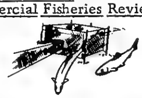
FISHING RESULTS: Northern Lake Michigan: The best catches of alewife (1,100 to 1,800 pounds) were made in 15 to 25 fathoms off Sturgeon Bay, Wis. Other good catches of alewife were taken in 15 fathoms off Beaver Island (550 pounds) and in 20 fathoms east of Manistique (450 pounds). The almost total lack of alewife off Frankfort, Mich., where 8 drags from 20 to 60 fathoms produced only 15 pounds of that species, was of special interest. Chubs were generally scarce except for catches of about 400 pounds taken in individual drags at 35 fathoms off Sturgeon Bay and 25 fathoms off Frankfort. Yellow perch were again totally absent from catches in northern Lake Michigan.

Green Bay: Catches of alewife in Green Bay were generally under 350 pounds. However, 3 large alewife catches of 700, 800, and 2,000 pounds were taken in 13-18 fathoms east of Cedar River. Significant amounts of carp and suckers were taken in southern Green Bay, where 4 drags produced carp in amounts ranging from 80 to 600 pounds and 4 drags yielded suckers in amounts of 55 to 400 pounds. Smelt were taken throughout the bay, and 7 of the 14 smelt catches averaged over 100 pounds. Catches of yellow perch and chubs were insignificant.

Southern Lake Michigan: Commercially significant catches of alewife, ranging up to 1,100 pounds per 30-minute drag, were taken in 10-25 fathoms off St. Joseph, 5-15 fathoms off Waukegan, 10-20 and at 30 fathoms off Port Washington, at 15 and 25-30 fathoms off White Lake, 10-25 fathoms off Manitowoc, and at 15 fathoms off Ludington. Chub catches were relatively light with the best catches (300 to 390 pounds) being taken at 35 and 40 fathoms off St. Joseph, 25 and 45 fathoms off Waukegan, 20 and 25 fathoms off Port Washington, and 50 fathoms off Ludington. The only significant catch of yellow perch (490 pounds) was taken at 10 fathoms off Waukegan. Sculpins were taken in moderate amounts at the deeper depths.

HYDROGRAPHIC DATA: During the cruise, the surface water temperatures of Lake Michigan ranged from 50° to 65° F.; those of Green Bay ranged from 57° to 63.5° F. Air temperatures ranged from 46° to 70° F. Bathythermograph casts were made in each fishing area.

Note: See *Commercial Fisheries Review*, Nov. 1964 p. 30.



Great Lakes Fishery Investigations

LAMPRICIDE TREATMENT OF STREAMS TRIBUTARY TO LAKE MICHIGAN:

Plans to treat the lower Muskegon River from Mewaygo Dam downstream to Muskegon Lake with lampricide starting some time in October 1964 were announced this past fall by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Ann Arbor, Mich.

The Muskegon is one of the larger rivers scheduled for treatment in the continuing program to rid Lake Michigan of the sea lamprey. The lampricide kills several generations of immature sea lampreys which live in the stream beds. Control of the lampreys is necessary before lake trout can be re-established in Lake Michigan.

The Director of the Bureau's Biological Laboratory at Ann Arbor warned that the lampricide may take some toll of fish in the Muskegon and other southern Michigan rivers yet to be treated. He said, "As we get to these southern streams which have a diversified population of both trout and warm-water fish, our problems become more difficult. We take every possible precaution and even run advance tests, but occasionally the chemical kills some fish. Most times, no game fish are lost. There is no way of predicting precisely what will happen on any particular treatment project."

An earlier treatment of the lower Boyne River in Charlevoix County caused some mortality among brown and brook trout. The Laboratory Director said brown trout seem particularly susceptible. He speculates that yellow pike (walleyes) may also be affected in the Mus-

kegon to some degree. On the other hand, there may be no mortality at all.

The Michigan Department of Conservation will observe with interest the lampricide treatment of the Muskegon. Any substantial losses of fish normally would be replaced by restocking by that Department if deemed necessary. (News Bulletin, Michigan Department of Conservation, October 1, 1964.)

Note: See Commercial Fisheries Review, September 1964 p. 21; August 1964 p. 28.

Gulf Fishery Investigations

Some of the highlights of studies conducted by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex., during July-September 1964:

SHRIMP BIOLOGY PROGRAM: Shrimp Larvae Studies: Efforts during the quarter were largely directed toward culturing larvae of the seabob, Xiphopeneus krøyeri. Such larvae seem to be more demanding in their environmental requirements than are those of the brown shrimp, Penaeus aztecus, and more difficulty was encountered in rearing them. Viable eggs were obtained four times, but attempts to rear the larvae to the first postlarval stage were unsuccessful. The third protozoea was the most advanced stage attained.

Enumeration of planktonic-stage Penaeidae sorted from 166 plankton samples collected between March and June 1963 disclosed a marked increase in their relative abundance since the previous low in February. In general, the greatest concentrations of those planktonic forms occurred in the western portion of the study area (Port Aransas-Brownsville).

Representatives of the genus Penaeus, with greatest density at the 15- and 25-fathom stations, exhibited approximately a threefold increase in abundance over that observed in February. Analysis of monthly catches by developmental stage showed that in March approximately 45 percent of the catch was composed of postlarvae. In contrast, the numbers of postlarvae decreased over the next 3 months when nauplii and protozoeae made up the bulk of the sample catch. The observation that 70-95 percent of all planktonic Penaeus collected from April to June consisted of shrimp in the first two stages of larval development is indicative of appreciable spawning activity during that period.

Florida Bay Ecology Studies: A major objective of this project is to determine the density distribution of juvenile pink shrimp. Most attention during the quarter was given the final development and field testing of a device to obtain efficiently the necessary samples.

In a series of tank trials, the sampler consistently entrapped all of the test shrimp surrounded by the enclosure within 15 minutes of the time the repellent was released. During field tests on beds of "sea grass" (Thalassia and Diplanthera) in Biscayne Bay, as many as eight Penaeus shrimp were caught per one-half square meter of bottom. The device will next be observed under field conditions and on substrates typical of those characterizing areas in eastern Florida Bay over which young shrimp migrate from peripheral estuaries to Gulf fishing grounds off Dry Tortugas. In addition to Penaeus shrimp of 12 to 18 mm. total length, other organisms captured by the sampler included crabs, caridean shrimp, amphipods, isopods, stomatopods, hermit crabs, spiny lobsters, snails, and fish.

Abundance and Distribution of Larvae of Pink Shrimp on the Tortugas Shelf of Florida: During the cruise of July 7-9, low-velocity currents on the Tortugas grounds were measured with a Richardson automatic recording current meter. Observations extended over a period of 25 hours. A second trial in mid-August failed to give satisfactory information on current speed because of instrument failure. Plankton hauls were made at regular intervals over a $26\frac{1}{2}$-hour period in the area immediately adjacent to the site at which the current meter was used.

Bathythermograph observations disclosed the presence of an extremely strong thermocline at 6 out of 10 stations occupied over the period August 18-21. By September 1-3 it was evident at all but the shallowest station occupied (12 m.). The two final cruises scheduled for this study will be consolidated as a single cruise over the period September 28 to October 3. Its main objective will be to obtain data on the distribution of larvae over a wide area surrounding the Tortugas fishing grounds.

Computer processing of plankton data was initiated. An IBM format employing two cards is being utilized. (Conducted by University of Miami under contract.)

Juvenile Phase of the Life History of the Pink Shrimp: The numbers of juvenile pink shrimp (Penaeus duorarum) leaving the Whitewater Bay-Coot Bay estuary via Buttonwood Canal were considerably higher in the first 8 months of 1964 than during the same period of 1963. In 1963, peaks of relative abundance occurred in January, April, and September, the latter two being the largest and about equal in magnitude. Data for 1964, compared with those of the previous year, show a lesser peak in March and a larger one in June. The relative abundance of shrimp leaving the estuary in June 1964 was nearly three times that of April or September 1963. Periods of lowest abundance occurred during the winter and peaks of abundance were evident in spring, summer, and early fall.

Using preliminary summaries, provided by the Bureau, commercial landings of small shrimp (68 count and over) from the Tortugas grounds were compared with catches of subadults in Buttonwood Canal for each month since January 1963. The amount of time apparently required for shrimp to move from Buttonwood Canal to the Tortugas grounds ranges from 1 to 2 months. During periods of moderate abundance, the lag seems to be 1 month; in times of highest abundance it increases to 2 months. (Conducted by University of Miami under contract.)

SHRIMP DYNAMICS PROGRAM: Surveys of Postlarval Abundance and Fisheries for Bait (Juvenile) Shrimp: Postlarval shrimp are now being sampled routinely, once or twice a week, at four locations along the Texas coast (Sabine Pass, Gilchrist, Galveston, and Port Aransas). Collections are made with a 5-foot

beam trawl at each station with the exception of the one at Gilchrist. There, strong tidal flows make it more feasible to use a $\frac{1}{2}$-meter plankton net. The table summarizes the results of recent collections from Galveston Entrance and Sabine Pass. Considerable time this quarter was devoted to processing material collected during several special studies last spring to investigate patterns of movement of postlarval brown and white shrimp as they enter the Galveston estuary.

Fig. 1 - Entrance to U. S. Bureau of Commercial Fisheries Biological Laboratory.

On two occasions during the quarter, large numbers of postlarvae collected at Port Aransas were transported to the salt-water laboratory where they are being reared to the juvenile stage. Subsamples from the collections are being preserved at 2-week intervals in order to develop a reference collection which will include early growth stages of the brown, white, and pink shrimp.

The harvest of bait shrimp from the Galveston Bay system during the first 8 months of this year has been considerably below production for the same period in 1963. Landings of small brown shrimp for bait decreased by 32 percent, and the production of white shrimp was 6 percent below last year's level. Predictions of the abundance of bait shrimp based on collections of postlarval brown shrimp during the spring of this year had indicated a decline of 36 percent below the level recorded in 1963.

Commercial Catch Sampling: Catch-sampling activities along the Texas and Louisiana coasts increased during the quarter in response to seasonal peaks in abundance of brown and white shrimp. Approximately 2,700 interviews were obtained by personnel stationed at Aransas Pass, Freeport, and Galveston, Tex., and at Morgan City, La. Interview information indicated that the center of the brown shrimp fishery throughout most of the third quarter was located in depths of 8 to 15 fathoms SSW. of Galveston where catches averaged about three boxes per night. Less than 2 percent by weight of the overall harvest in that area was discarded at sea, although as much as 40 percent (in the form of small shrimp) was culled from isolated catches. No record of discarding small white shrimp was obtained from vessels fishing in offshore waters between Galveston and Morgan City. Five trips were made aboard commercial shrimp vessels to observe actual discarding practices during the period.

The shrimp fleet at Key West, Fla., decreased in size to about 50 vessels in midsummer, although catches averaged close to four boxes per night. Interview information indicated that virtually no small pink shrimp were discarded during July, but beginning in August, approximately 20 percent by weight of catches made at 10 to 15 fathoms was culled. Observations made at sea aboard a commercial trawler revealed that 15 percent of its catch was discarded.

Migrations, Growth, and Mortality of Brown and White Shrimp: In the latter part of June, 2,180 tagged brown shrimp ranging in total length from 96 to 220 mm. were released in 14 to 17 fathoms off Freeport, Tex. To date, 152 (7 percent) have been returned. The distribution of these recoveries indicated little offshore movement in July and August. Only 5 shrimp were recovered beyond 20 fathoms, although considerable fishing effort was expended at greater depths. Coastwise movement also appeared to be restricted, as most of the shrimp were recaptured close to the release sites. The average distance traveled was less than 13 miles with the longest recorded movement being 115 miles.

In mid-August a total of 3,384 stained shrimp, ranging in size from 108 to 186 mm., was released at 13 to 17 fathoms off Freeport. By mid-September, 210 (6 percent) of those had been recovered.

Population Dynamics: Three cruises were made during the quarter to define further the selective characteristics of the meshes of shrimp nets. The validity of our experimental method, which compares the size of shrimp retained by cod-end meshes with the size of those that escape to the cod-end cover, was verified by a series of hauls in which nets with covered and uncovered cod-ends were towed simultaneously. No significant difference in the size of shrimp retained by either type of cod end was evident. Differential effects of the distance or duration of gear travel were investigated by comparing results from hauls in which the trawl was towed for periods of $\frac{1}{2}$, 2, and 4 hours. The size of shrimp retained by the gear increased markedly during the longer tows, presumably because the shrimp had greater opportunity to escape. Comparisons of the selective action of cod ends constructed of various natural and synthetic fibers were inconclusive and will be repeated at a later date.

Fig. 2 - Bringing in a sample trawl on board the U. S. Bureau of Commercial Fisheries vessel Tommy Box in Galveston bay.

Abundance of Postlarval Shrimp in Mississippi Sound and Adjacent Waters: Regular sampling continued during the quarter. The postlarvae of all commercial penaeids collected through July were separated and identified. In August the quantity of debris, including dead eelgrass

and, more recently, Zoobotngon, increased at most stations. This slowed the process of separating shrimp to such a degree that specific determination of material in some samples remains imcomplete.

Catch per unit of sampling effort in July was well below that for July 1963. Numbers of postlarvae increased sharply in August and September, however, and 1964 averages were about 80 percent higher than in 1963. Brown shrimp accounted for much of the increase.

A study of the juveniles occurring in all samples collected through July 1964 has begun. The large numbers of postlarvae caught in the early part of 1964 were not reflected by the size of the juvenile population observed later in the season. (Conducted by Gulf Coast Research Laboratory under contract.)

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: Synoptic hydrological and biological sampling under the revised scheme initiated in March 1964 continued during the quarter. A study of primary productivity in the Galveston estuary was initiated in July, and bottom fauna sampling was terminated in September, as planned, after 1 year. The white shrimp was the most numerous species taken in trawl samples during the quarter, followed in descending order of abundance by the Atlantic croaker, the brown shrimp, and the bay anchovy. Brown shrimp, which entered the estuary as postlarvae in the previous quarter, began their Gulfward migration as subadults, whereas white shrimp, which enter the system slightly later than the browns, did not reach peak abundance until midquarter. Both brown and white shrimp and the bay anchovy were present in fewer numbers than during the same period in 1963, with white shrimp numbers being only slightly reduced, brown shrimp numbers being down by slightly more than one-third, and anchovy numbers showing a decrease of more than two-thirds. The Atlantic croaker, on the other hand, exhibited more than a twofold increase over the previous year. Blue crab numbers were about the same as last year and not appreciably changed from the previous quarter.

Brown and white shrimp were concentrated in greatest numbers in the area near the mouth of the San Jacinto River. That area receives a large volume of industrial and municipal wastes via the Houston Ship Channel, yet its utility as a nursery environment for shrimp appears not to be suffering impairment.

Length-weight conversions have now been calculated for the Atlantic croaker, spot, sand sea trout, and bay anchovy, and will provide a distinct aid in future project research.

A study of the distribution and abundance of postlarval and early juvenile brown shrimp in Galveston Bay during 1963 and 1964 was completed. Preliminary findings indicate that postlarvae, upon entering the estuary from the Gulf, tend to move toward the peripheral marsh areas and bayous, utilizing predominantly the Houston Ship Channel, Intracoastal Waterway, and deeper waters of the bay as avenues of migration. They were observed to spread throughout the estuary and concentrate in the marshes and bayous within 2 weeks of first entry. The young shrimp spend 2 to 4 weeks, growing rapidly, in those highly productive edge areas, and as juveniles once again disperse throughout the estuary before eventually returning to the Gulf. Differences between temperature cycles in 1963 and 1964, during the time of postlarval influx and subsequent development, suggest that the duration of the estuarine phase of the brown shrimp's life history is regulated in large part by water temperature through its probable effect on rate of growth.

INDUSTRIAL BOTTOMFISH FISHERY PROGRAM: Life Histories of Central Gulf Bottomfish: Analysis of samples regularly drawn from industrial bottomfish catches made near shore east of the Delta since 1959 has shown that a seasonal increase in the abundance of croaker occurred during May-June in each year except 1960. In June 1964, the croaker catch per hour amounted to only 0.13 tons, compared with the monthly average of 0.35 tons calculated for the period 1959-63. Moreover, statistics of species composition revealed that the croaker stock contributed but 16 percent to the overall June catch, in contrast to its 5-year (monthly) average of 48 percent. Fish were more abundant offshore in 20 fathoms where thay made up 51 percent of the total catch, with trawl hauls there averaging 0.33 tons per hour. Population age structure, as determined from length frequency data, revealed that yearling fish were largely present near shore, while fish predominantly 2 and 3 years old were caught offshore. Increased catches of croaker were evident near shore in July, and by August the species catch-per-unit-of-effort and percentage contribution again reached normal levels. The entire catch from the near shore grounds consisted largely of 1- and 2-year-old fish with older individuals being dominant. The data also suggest that age group II, upon which the fishery primarily depends during summer, did not attain normal proportions on near-shore grounds until August after its members had moved in from offshore.

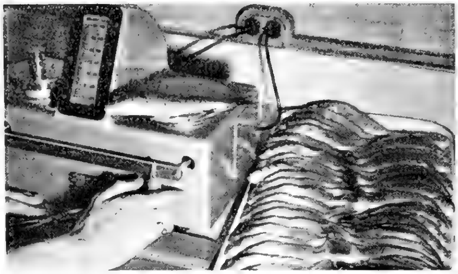


Fig. 3 - Weighing specimens of Atlantic croaker (*Micropogon undulatus*) in the laboratory.

Samples of juvenile croaker collected in Mobile Bay by personnel of the Alabama Marine Resources Laboratory, as well as adult croaker taken off the northern Gulf coast by Bureau biologists at Galveston, continued to be processed for life history data.

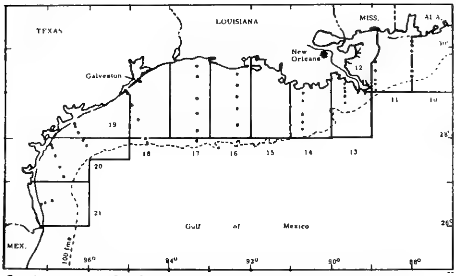
Note: See Commercial Fisheries Review, July 1964 p. 15.

* * * * *

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-21 (September 17-29, 1964): Catches of brown shrimp from several statistical areas ran to large sizes (from 12-15 to 21-25 to the pound) during

this shrimp sampling cruise in the Gulf of Mexico by the chartered research vessel Gus III, operated by the U.S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex.



Station pattern for shrimp distribution studies by M/V Gus III, Cruise GUS-21.

Eight statistical areas extending from off the Louisiana coast to Texas were covered and standard 3-hour tows with a 45-foot shrimp trawl were made. During this cruise, 38 tows with the 45-foot flat trawl and 80 plankton tows were made, and 34 bathythermograph and 120 water (Nansen bottle) samples were taken. Also, a total of 144 drift bottles were cast at 26 stations.

Area 13 was the most productive, with catches from the three depth ranges totaling slightly below 100 pounds. The over 20-fathom depth of that area yielded 51 pounds of 21-25 count brown shrimp--the largest haul of the cruise--as well as a relatively large catch (36 pounds) of white 15-20 count shrimp from the under 10-fathom depth. The 10-20 fathom depth of the area accounted for a smaller haul, but the catch consisted of large brown shrimp.

The over 20-fathom depth in area 17, 18, 20, and 21 was productive for large brown shrimp, followed by moderate to good catches of smaller shrimp of the same species in 10-20 fathoms. Some white shrimp also were taken from those areas--the largest catch consisting of 13 pounds in 10-20 fathoms of area 21.

Area 19 accounted for an 18-pound catch of 26-30 brown shrimp in 10-20 fathoms and 12 pounds of white 12-15 count shrimp from the under 10-fathom depth range.

Small quantities of pink shrimp of various sizes ranging from under 1 pound up to 2 pounds were taken from most areas.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, Nov. 1964 p. 34.

Industrial Fishery Products

CALCIUM AND PHOSPHORUS IN FISH MEAL FOUND ENTIRELY AVAILABLE TO CHICKENS:

Menhaden fish meal contains, on the average, 5.5 percent calcium and 3 percent phosphorus; the values of those minerals in a ton of fish meal are about \$1 and \$13, respectively. It generally has been assumed that those minerals are nutritionally completely available when consumed by fowl, swine, and other animals, but this was never established experimentally until recently. Now, on the basis of research at the U.S. Bureau of Commercial Fisheries Technological Laboratory, College Park, Md., it is known that both the calcium and phophorus of fish meal are entirely available to chickens.

These findings were established by comparing the results of feeding chicks diets containing di-calcium phosphate and limestone at various levels with the results of feeding 12 different samples of menhaden meal at two different levels and menhaden meal ash also at those levels. Both levels were low enough to constitute a sensitive assay of the effects of changing the amounts of the two minerals in the rations. Fish meal ash at two levels was included to determine if it contains trace minerals that would have any observable effects on bone mineralization in the nonfish meal diet. Levels of minerals deposited in the bones of test chicks were measured to determine whether there were differences between test chicks fed fish meal rations and those fed rations containing minerals from inorganic sources or from fish meal ash. Because no important differences were observed, it was concluded that calcium and phosphorus in fish meal are completely available to chickens.

The Bureau's laboratory research on the subject was reported on August 5, 1964, at the 53rd Annual Meeting of the Poultry Science Association held at the University of

Minnesota, St. Paul, Minn. (Technical Advisory Unit, U.S. Bureau of Commercial Fisheries, Boston, Mass.)

* * * * *

VIEWS ON USE OF FISH MEAL AND OIL IN ANIMAL NUTRITION:

The Arkansas Formula Feed Conference held in September 1964 at Fayetteville, Ark., was sponsored by the Arkansas Feed Manufacturers Association and the Department of Animal Industry of the State University. The Conference was attended by a nutritionist of the U. S. Bureau of Commercial Fisheries, Technical Advisory Unit, Boston, Mass. Following the meeting he visited mixed feed manufacturers in southern Missouri and Tennessee, and also the Tennessee Agricultural Experiment Station at Knoxville.

To the extent that they dealt with proteins and other nutrients contained in fish meal, all of the conference papers on poultry and swine nutrition had important bearings on industrial fishery products. As an example of the relation between the information offered and practical utilization of fish meal, it is worthy of note that three different conference speakers stressed the importance of avoiding excess calcium in poultry feeds. Such an excess, it was reported, tends to limit both growth and egg production of chickens, and growth and feed efficiency of turkeys and acts as well to produce leg weakness in this species. It appears that feed formulators must place maximum limits upon the total calcium in poultry rations in addition to the minima already used. If this is done, the calcium in fish meal and other feed ingredients must be entered into the calculations: thus fish meal will be given credit for its calcium content. In addition, if the calcium value of fish meal is recognized, logically the phosphorus value of the meal will also be taken into account. The result should be a recognition of the calcium and phosphorus values of fish meal, values that are from a monetary point of view, respectively $1 and $13 per ton. In the past the mineral values of fish meal have largely been neglected by formulators.

Some mixed feed manufacturers visited by the nutritionist expressed concern with the prospective shortage of fish meal and advancing prices of industrial fishery products. But none reported having reduced fish meal levels in their products within the past year.

At the Tennessee Agricultural Experiment Station, investigators are studying the UGF (unidentified growth factor) content of fish meal in relation to poultry requirements and the possibility of using fish oil in ruminant feeding. The UGF studies have shown that as little as 1 percent of fish meal in poultry rations will produce the maximum growth stimulus obtainable with UGF. This work has been repeated a second time with confirmatory results and will be repeated again. The experiments with fish oil involved feeding menhaden oil to calves starting at the age of 7 days. The animals grew well when the oil level was around 2 percent of the concentrate mixture. But when the oil level was raised to 5 percent, those young calves consumed less concentrate and more hay with a resulting lowering of the energy intake and decreased growth rate. The results indicate that menhaden oil can be used to good advantage at a level of 2 percent--a level at which fats and oils are frequently used to control losses in the form of dust from ground and chopped feed mixtures. Such use of fish oil would, of course, be uneconomical at present prices but would become feasible if the price of fish oil should drop low enough to make it competitive with the oils and fats presently used in animal feeding. (Technical Advisory Unit, U. S. Bureau of Commercial Fisheries, Boston, Mass., October 16, 1964.)

* * * * *

U.S. FISH MEAL, OIL, AND SOLUBLES:

Production by Areas, September 1964: Preliminary data on U.S. production of fish meal, oil, and solubles for September 1964 as collected by the U.S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

U. S. Production 1/ of Fish Meal, Oil, and Solubles by Areas, September 1964 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized 3/
	Short Tons	1,000 Pounds	. . . . (Short Tons)	
September 1964:				
East & Gulf Coasts	20,296	17,898	7,996	-
West Coast 2/	2,720	750	1,649	-
Total	23,016	18,648	9,645	-
Jan.-Sept. 1964 Total	185,832	152,826	74,082	-
Jan.-Sept. 1963 Total	194,062	153,746	76,934	7,224

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes American Samoa and Puerto Rico.
3/Includes condensed fish.

* * * * *

Major Indicators for U. S. Supply, August 1964: United States production of fish meal in August 1964 was lower by 26.0 percent as compared with August 1963. Production of

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, August 1964

Item and Period	1/1964	1963	1962	1961	1960
	. . . . . (Short Tons)				
Fish Meal:					
Production:					
August	31,880	43,069	40,440	57,537	51,248
January-August	2/162,816	172,613	217,878	223,474	187,741
Year 3/	-	253,452	312,259	311,265	290,137
Imports:					
August	36,543	43,987	28,253	19,026	8,340
January-August	321,835	269,144	194,996	145,562	87,846
Year	-	383,107	252,307	217,845	131,561
Fish Solubles:					
Production: 4/					
August	13,361	18,770	16,811	19,685	16,921
January-August	2/ 64,437	80,066	90,525	82,474	72,743
Year	-	107,402	124,649	112,254	98,929
Imports:					
August	125	-	422	318	180
January-August	3,682	2,769	5,018	2,245	2,794
Year	-	6,773	6,308	6,739	3,174
	. . . . . (1,000 Lbs.)				
Fish Oils:					
Production:					
August	26,131	34,610	33,394	49,671	36,912
January-August	2/134,178	133,189	176,718	195,935	133,739
Year	-	185,827	250,075	258,118	290,143
Exports:					
August	9,664	37,455	33,272	13,304	1,395
January-August	106,252	164,604	96,405	85,853	94,819
Year	-	262,342	123,050	122,486	143,609

1/Preliminary.
2/Data for 1964 based on reports which accounted for the following percentage of production in 1963: Fish meal, 95 percent; solubles and homogenized fish, 99 percent; and fish oils, 99 percent.
3/Small amounts (10,000 to 25,000 pounds) of shellfish and marine animal meal and scrap not reported monthly are included in annual totals.
4/Includes homogenized fish prior to 1964--none produced in 1964.

fish oil was down by 24.5 percent and production of fish solubles decreased 28.8 percent.

* * * * *

Production, August 1964: During August 1964, a total of 26.1 million pounds of marine-animal oils and 31,880 tons of fish meal was produced in the United States. Compared with August 1963 this was a decrease of 8.5 million pounds of marine-animal oils and 11,189 tons of fish meal and scrap. Fish solubles production amounted to 13,361 tons--a decrease of 5,409 tons as compared with August 1963.

Menhaden oil production amounted to 22.2 million pounds--a decrease of 8.4 million pounds. Menhaden fish meal and scrap production in August 1964 amounted to 24,866 tons--a decrease of 10,548 tons as compared with the same month of 1963.

U.S. Production of Fish Meal, Oil, and Solubles, August 1964 1/with Comparisons

Product	August 1/1964	August 1963	Jan.-Aug. 1/1964	Jan.-Aug. 1963	Total 1963
	. . . . (Short Tons) . . .				
Fish Meal and Scrap:					
Herring	2,179	2,693	8,087	5,312	7,537
Menhaden 2/	24,866	35,414	120,972	135,119	181,750
Tuna and mackerel	2,854	2,318	17,428	13,969	26,957
Unclassified	1,981	2,644	16,329	18,213	22,415
Total	31,880	43,069	162,816	172,613	238,659
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	14,793
Grand total meal and scrap	3/	3/	3/	3/	253,452
Fish solubles:					
Menhaden	11,436	15,442	51,754	55,515	74,831
Other	1,925	3,328	12,683	17,417	25,347
Total	13,361	18,770	64,437	72,932	100,178
Homogenized condensed fish	-	762	-	7,134	7,224
	. . . . (1,000 Pounds)				
Oil, body:					
Herring	2,357	2,115	9,519	4,630	5,709
Menhaden 2/	22,176	30,580	116,806	120,872	167,635
Tuna and mackerel	899	715	3,293	2,745	5,735
Other (including whale)	699	1,200	4,560	4,942	6,748
Total oil	26,131	34,610	134,178	133,189	185,827

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.

* * * * *

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-August 1964: Based on domestic production and imports, the United States available supply of fish meal for January-August 1964 amounted to 484,651 short tons--42,894 tons (or 9.7 percent) more than during January-August 1963. Domestic production was 9,797 tons (or 5.7 percent) less, but imports were 52,691 tons (or 19.6 percent) higher than in January-August 1963. Peru continued to lead other countries with shipments of 257,604 tons.

The United States supply of fish solubles during January-August 1964 amounted to 68,119 tons--a decrease of 17.8 percent as compared with the same period in 1963. Domestic production dropped 19.5 percent but imports of fish solubles increased 33.0 percent.

U. S. Supply of Fish Meal and Solubles, January-August 1964 with Comparisons

Item	Jan.-Aug. 1/1964	Jan.-Aug. 1963	Total 1963
	. . . (Short Tons) . . .		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	120,972	135,119	181,750
Tuna and mackerel	17,428	13,969	26,957
Herring	8,087	5,312	7,537
Other	16,329	18,213	37,208
Total production	162,816	172,613	253,452
Imports:			
Canada	38,678	35,739	50,925
Peru	257,604	201,764	291,544
Chile	11,082	22,637	24,249
Norway	-	1,819	1,819
So. Africa Republic	11,938	5,975	12,296
Other countries	2,533	1,210	2,274
Total imports	321,835	269,144	383,107
Available fish meal supply	484,651	441,757	636,559
Fish Solubles:			
Domestic production 2/	64,437	3/80,066	3/107,402
Imports:			
Canada	1,162	1,541	2,034
Iceland	-	-	160
So. Africa Republic	860	191	411
Other countries	1,660	1,037	4,168
Total imports	3,682	2,769	6,773
Available fish solubles supply . .	68,119	82,835	114,175

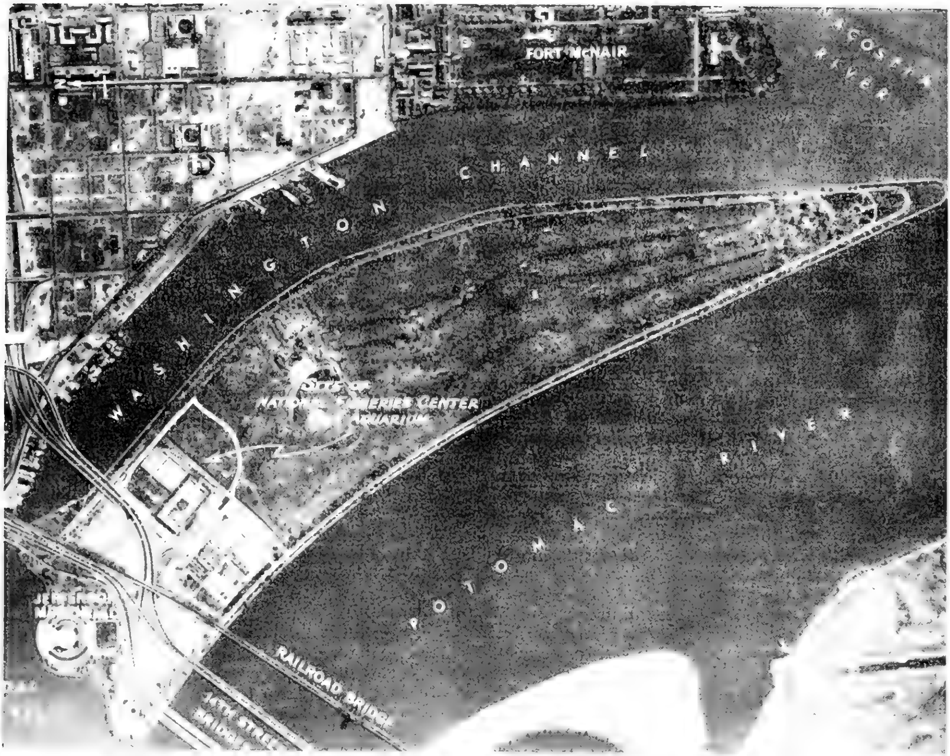
1/Preliminary.
2/50-percent solids.
3/Includes production of homogenized condensed fish.

National Fisheries Center and Aquarium

NEW PLANS APPROVED:

Plans under which the National Fisheries Center and Aquarium is to be built in East Potomac Park, Washington, D. C., were completed and approved by Secretary of the Interior Stewart L. Udall this past fall, and architects were proceeding with work on designs and specifications.

The new plans gave consideration to the redesigning and shortening of a nearby golf course in East Potomac Park which is used by golfers practically year-round. The new arrangement provides a total of 22 acres for the Fisheries Center and Aquarium, with construction slated to start early in 1966, and completion tentatively set for early 1968. The Center is expected to be the finest of its type in the world and will constitute a center for scientific research, as well as a showplace for aquatic life of all kinds.



Shows site of National Fisheries Center and Aquarium, Washington, D. C., construction of which will be completed in early 1968.

Legislation by Congress in 1962 authorized $10 million for construction of the facility but with the proviso that it be self-supporting, and requiring the repayment of construction and operational costs. This will be done by charging a visitor's admission fee to all except supervised youth groups. Visitors to the Fisheries Center and Aquarium are expected to number more than 3 million annually.

Note: See Commercial Fisheries Review, July 1964 p. 21; May 1964 p. 26; April 1964 p. 22.

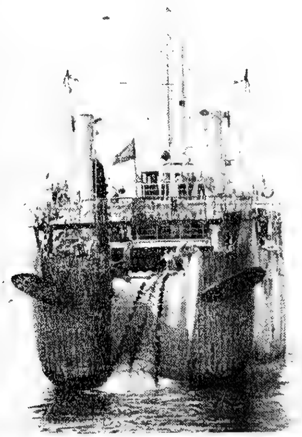
North Atlantic

FOREIGN FISHING ACTIVITIES OFF COAST, OCTOBER 1964:

In order to observe foreign fishing activities in the North Atlantic, the staff of the Fisheries Resource Management Office, U.S. Bureau of Commercial Fisheries, Gloucester, Mass., has been conducting weekly reconnaissance flights cooperatively with the U.S. Coast Guard.

During October 1964, a total of 47 Soviet fishing vessels was observed on Georges Bank in the North Atlantic. They were identified by type vessel as: 35 factory stern trawlers (BMRT, RRT, RMT); 9 fish transports; 3 fuel and water tankers. One Polish B-15 factory stern trawler was seen several times fishing with the Soviet fleet. Soviet

medium class side trawlers (SRT, SRT-R) left Georges Bank early in October. Their early departure may have been due to bad weather, as well as a lack of fish. A year earlier in October, 26 Soviet medium trawlers were still fishing on Georges Bank.



A typical stern trawler that fishes on Georges Bank. Entire cod-end with a catch of herring starts up the stern ramp.

A steady decline in herring catches by the Soviet trawlers was very noticeable during October. As the month progressed, it was observed that fewer trawlers had deckloads of herring, nor were the fish meal plants aboard the factoryships in constant operation.

By the end of October, the Soviet fishing fleet was spread out over Georges Bank, with groups of 3 or 4 vessels to as many as 25 to 30 fishing together. With few exceptions, all of the Soviet vessels observed during October were from the Port of Murmansk on Barents Sea. (Gloucester, Mass., November 9, 1964.)

North Atlantic Fisheries Explorations and Gear Development

EXPERIMENTS ON OFF-BOTTOM TRAWLING AS AGAINST CONVENTIONAL TRAWLING:

M/V "Delaware" Cruise 64-8 (September 17-22, 1964): To effect the adjustments required for satisfactory performance and the experimental fishing of (1) a number 41 manila otter-trawl, and (2) a nylon midwater trawl in an "off-the-bottom" manner was the purpose of this cruise, mostly in Ipswich Bay, by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware. Both nets were rigged to fish with the footrope between 1 and 3 fathoms above the bottom when towed behind regular bottom-type trawl doors. After being rigged to satisfactorily fish in that manner, the nets were to be set on concentrations of ocean perch (redfish) or other groundfish (such as cod and haddock) when they were found to occur a few fathoms off the bottom.

Fish traces were observed on a white-line echo-sounder and scope. By means of a headrope-mounted transducer and a conductor cable to the ship (third wire), the distance the headrope was above the bottom and also the net opening were either recorded on an echo-sounder paper or were measured on the fish-scope tube.

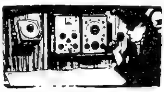
The first three days of the cruise were spent in Ipswich Bay experimenting with various numbers of floats, weights, and lengths of ground cables needed to float the net at the desired height above the bottom. The number 41 net was originally fitted with three 15-foot sections of rollers, 8-inch aluminum floats, (35 of them), 5-fathom legs, and 10-fathom ground cables. By lengthening the ground cables to 20 fathoms and adding 14 floats to the wings and bosom, the net fished about one fathom off the bottom and kept the same vertical distance between headrope and footrope (9 feet). Later, the rigging of the net was modified by removing the roller sections and replacing them with a chain footrope. A 3-fathom dropper line of one-half inch chain was hung from each lower wing end and the number of floats was increased to 71 (including 3 along each gore in the belly section). The trawl then fished $1\frac{1}{2}$ fathoms above the bottom. With that arrangement, the net fished at a fairly constant height; as the net tended to lift or settle additional or decreased weight (or downpull) was exerted by the dropper chain as the length of chain supported by the bottom changed.

A "Herman Engel" nylon midwater trawl was fished with the 4 x 8-foot bottom doors using 20-fathom ground cables and 35-fathom legs. The addition of a 15 fathom third leg, extending from the gore at the wing end of the net to a shackle on the bottom leg and 15 fathoms

from the net, allowed the vertical opening of the net to increase from 18 to 36 feet. With 8-inch floats (76 of them) on the headrope, this net fished with the footrope 1 to 2 fathoms above the bottom and reached a headrope height of 7 fathoms.

Because of the threat of hurricane Gladys, the full objectives of the cruise were not fulfilled. No concentrations of food fish were seen on the echo-sounder and no significant catches of either ocean perch (redfish) or groundfish were made. But the midwater trawl caught about 7,000 pounds of dogfish in Ipswich Bay during the preliminary trials. The tracing of that school (on the sounder) was from near the bottom to 4 fathoms above the bottom and was extremely dense.

Gear rigged in a similar manner may prove to be effective in harvesting schools of fish which are above the reach of trawls rigged to fish on the bottom in the conventional manner. The changeover can be done quite rapidly and with little expense. Interim use of this method as an alternate to conventional trawling would be compatible with normal fishing routine. Further experiments are to be carried out on subsequent cruises.



North Atlantic Fisheries Investigations

SEA SCALLOP POPULATION SURVEY ON GEORGES BANK CONTINUED:

M/V "Albatross IV" Cruise 64-12 (October 7-15, 1964): To collect data on the distribution and abundance of sea scallops at the major scallop grounds on Georges Bank and to obtain sediment samples from the ocean floor were the objectives of this cruise by the U.S. Bureau of Commercial Fisheries research vessel Albatross IV.

During the cruise a total of 152 tows was made at 144 stations using a 10-foot standard scallop dredge with a 2-inch ring bag. Some 26 bottom samples were collected at 8 designated stations and 6 tows at 4 stations were made with the beam trawl, 2 of which were made with a camera mounted on the beam trawl frame.

About 150 live red hake taken on the cruise were returned to the Bureau's Woods Hole Biological Laboratory for studies on their sensory apparatus and 50 live sea scallops were brought back to the laboratory for spawning studies. Sex ratios of scallops were taken at 17 stations during the cruise.

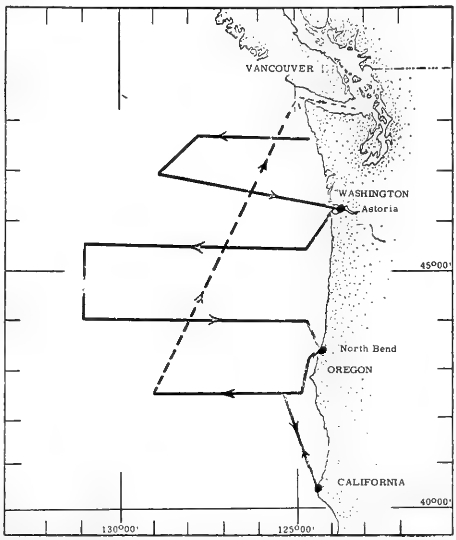
Hydographic information was collected from 170 bathythermograph casts made at each station at hourly intervals while under way.

Note: See Commercial Fisheries Review, August 1964 p. 34; August 1963 p. 41.

North Pacific Fisheries Explorations and Gear Development

ALBACORE TUNA ABUNDANCE AND DISTRIBUTION SURVEY:

M/V "John N. Cobb" Cruise 66 (July 13-31, 1964): To obtain information on the abundance and distribution of albacore tuna (*Thunnus alalunga*) and other pelagic fish species was the principal objective of this cruise by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb.



Shows trackline during Cruise 66 of the exploratory fishing vessel John N. Cobb, July 13-31, 1964.

The area of operations during the three-week cruise was off the Washington, Oregon, and California coasts extending from about 20 miles off the coast to 250 miles offshore (longitude 130° 00' W.) between latitude 47° 50' N. and 41° 07' N. Basic oceanographic data were collected along the trackline by staff members from the Bureau's Biological Laboratory, San Diego, Calif. The trackline covered a distance of about 1,300 miles.

The cruise was interrupted by several unscheduled port calls, a stop at Coos Bay for repairs to the vessel's steering system, and also curtailed sea operations for several days because of bad weather.

A total of 16 stations were occupied for the collection of oceanographic data which included salinity, oxygen, and chlorophyl determinations. Between stations, 32 bathythermograph (BT) casts and surface water temperature readings were taken. A continuous watch was maintained during daylight hours for schools of tuna, other pelagic fish, bird flocks, mammals, and other aquatic life.

Trolling, using 7 lines towed at a speed of about 7 knots, was generally conducted during daylight hours. A red-and-white feathered jig was the most common lure used. Those were supplemented on occasion by green-and-white or yellow-and-white feathered jigs or by light or dark colored bone-type jigs. Strikes and catches of albacore tuna were distributed about equally between the 7 lines. Most of the tuna were caught on the southernmost extension of the trackline.

A total of 74 albacore tuna was caught, of which 24 viable fish were tagged and released. Blood samples were immediately taken from the other tuna, and the carcasses frozen for future biological studies. Lengths of the albacore varied from 55 to 79 centimeters (21.7 to 31.1 inches) with about 66 percent ranging between 61 to 65 centimeters (24.0 to 25.6 inches). Samples ranged from 7.5 to 22.5 pounds with 70 percent between 10.5 and 13 pounds.

Night-light stations were fished using both monofilament nylon gillnets with mesh sizes ranging from 1" to $1\frac{1}{2}$" and of lengths 3 to 7 fathoms long, and small-mesh dip nets. No concentrations or schools of fish were observed at those stations. Best catches for each effort varied from 2 or 3 individuals for lanternfish (Myctophidae), sablefish (Anoplopoma fimbria), anchovy (Engraulis mordax), and stickleback (Gasterosteidae), and up to 20 to 25 for saury (Cololabis saira), and squid (Loligo opalescens).

The John N. Cobb was scheduled to leave Seattle, October 19 for five weeks of exploratory midwater trawling in Puget Sound and along the Washington coast. That work was to be carried out in cooperation with the Washington State Department of Fisheries.

Objectives of the cruise were to: (1) investigate the distribution and abundance of hake, (2) evaluate the incidental catches of other pelagic fishes taken with the midwater trawl, and (3) cooperate in evaluating the fishing effectiveness of a midwater net by two-boat trawling.

Note: See Commercial Fisheries Review, September 1964 p. 32.

* * * * *

HAKE DISTRIBUTION AND ABUNDANCE EXPLORED:

M/V "John N. Cobb" Cruise 67 (August 10-October 9, 1964): To explore the depth (bathymetric) and geographic distribution of the hake resources off the Washington and Oregon coasts was the primary objective of this 8-week cruise by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb. Secondary objectives were to attempt to assess the amount of the hake resources and to collect pertinent data on the environmental factors influencing distribution and abundance patterns.

Sounding transects were run in an onshore-offshore direction at oblique angles to the coast at depths from 20 to 130 fathoms. When hake concentrations were located, the availability was measured with the 400-mesh eastern otter trawl or the "Cobb" pelagic (midwater) trawl.

Length-frequency and sex-ratio data were collected from most of the successful drags and a cursory examination was made for stomach contents. Surface-to-bottom and fishing gear depth-water temperatures were taken during the cruise.

Large concentrations of hake were found from the Strait of Juan de Fuca, Wash., to the Umpqua River, Ore. The largest catch, which was made with the "Cobb" pelagic trawl off Mukkaw Bay, Wash., in 53 to 55 fathoms, yielded 60,000 pounds of hake per one-half hour fished or an hourly rate of 120,000 pounds.

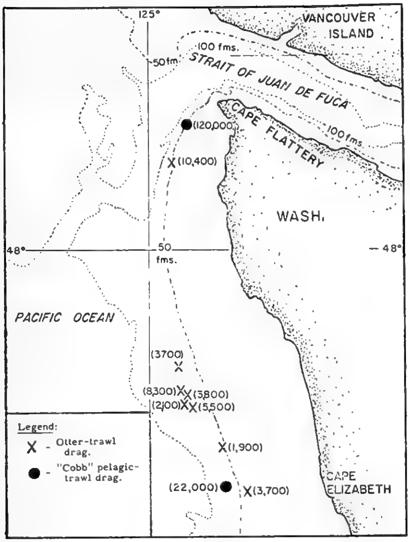


Figure 1

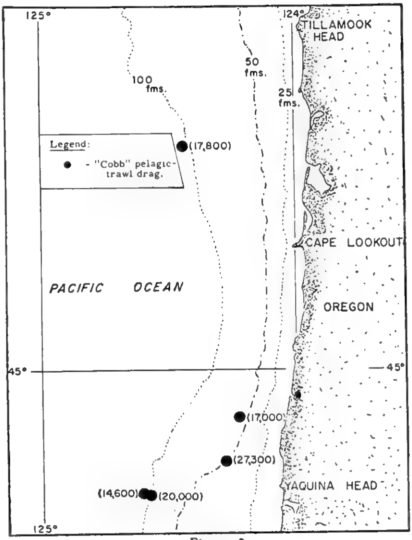


Figure 3

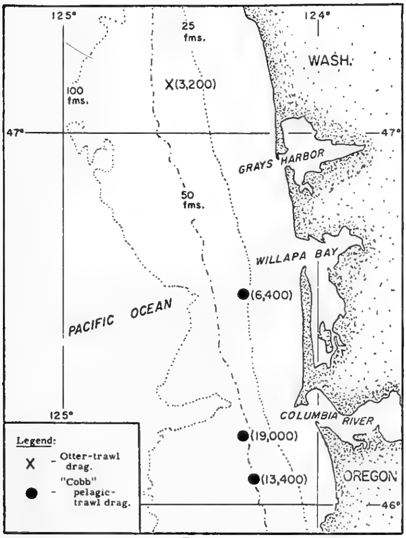


Figure 2

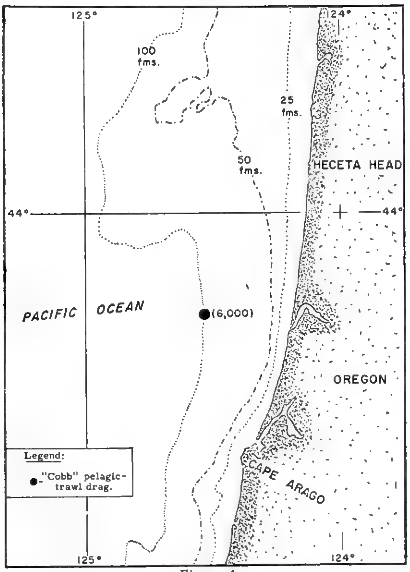


Figure 4

John N. Cobb Cruise 67 (August 10-October 9, 1964); hourly catch rates and locations of otter-trawl and "Cobb" pelagic-trawl drags which yielded: Fig. 1 - over 1,000 and 5,000 pounds per hour fished, respectively; and figs. 2, 3 and 4 over 5,000 pounds per hour fished.

Ten of the remaining 21 pelagic drags accounted for hake catches at rates from 6,000 to 28,000 pounds per hour fished, while 9 of the 14 otter-trawl drags yielded hake at rates from 1,200 to 10,700 pounds per hour fished.

Hake samples taken on this cruise were delivered to two reduction plants for reduction tests.

Note: See Commercial Fisheries Review, October 1964 p. 30; June 1964 p. 21.

* * * * *

MULTIPURPOSE PELAGIC TRAWL TESTED:

M/V "St. Michael" Cruise 3 (August 17-September 11, 1964): To evaluate and modify, as necessary for greatest efficiency, a newly designed multipurpose pelagic trawl (having long wings in a configuration similar to a lampara seine) was the primary objective of this 4-week cruise by the exploratory fishing vessel St. Michael, chartered by the U.S. Bureau of Commercial Fisheries.

Initially, the trawl had a total headrope length of 99 fathoms and was held open by 92 aluminum trawl floats measuring 8 inches each. Designed depth of the wings was 30 feet. The footrope consisted of 40 fathoms $\frac{3}{8}$-inch galvanized chain hung to the bottom of each wing from the tip aft, where it was joined to a $\frac{1}{2}$-inch braided nylon center section rope. The body of the net is similar to the after portion of the "Cobb" pelagic trawl. Both aluminum hydrofoil doors and conventional bottom doors were tested with the net.

Scuba divers evaluated the net design by means of underwater observations and measurements. Net spread at wing tips was determined to be about 84 feet as a pelagic trawl with hydrofoil doors. Use of bottom doors in contact with the sea bed extended the opening to 108 feet.

The necessary modifications to the multipurpose trawl used included: (1) replacing all footrope chain with manila-wrapped $\frac{1}{2}$-inch cable; (2) braided nylon headrope was changed to manila-wrapped $\frac{3}{8}$-inch cable; (3) installation of 10-fathom dandylines between the doors and wing tips; and (4) web in the wings was rehung to 30 percent hang-in.

Divers made observations on various fish species which entered into the influence of the net. Evidence of fish swimming out of the net was noted. On four separate occasions individual fish including dogfish (Squalus acanthias), black cod (Anoplopoma fimbria), and silver salmon (Oncorhynchus kisutch) were observed in the codend but had escaped before the net was retrieved.

After the modifications were completed, the net had a 16-foot maximum vertical wing opening and throat opening of 18 feet. When bottom doors are used the footrope at the wing tips remains about 6 feet off bottom and 15 feet off bottom at the net throat, permitting the net to be used over rough bottom for near-bottom fish species.

Although further studies of this net will be necessary, sufficient geometric configuration was attained to warrant fishing trials.

The chartered commercial fishing vessel St. Michael left Seattle September 21, 1964, on its next cruise for four weeks, to test the effectiveness of a newly-designed trawl on concentrations of hake and Pacific ocean perch in offshore waters of British Columbia, Washington, and Oregon. The trawl was to be fished near bottom, using aluminum hydrofoil doors or conventional bottom doors. Comparative hauls will be made with a "Cobb" pelagic trawl with aluminum hydrofoil doors.

Note: See Commercial Fisheries Review, November 1964 p. 47.

Oceanography

GIANT "ECHO-SOUNDER" MAPS SEABED AND ITS UNDERLYING STRUCTURE IN CARIBBEAN SEA:

A study of the seabed and its underlying rock structure was made during a 5,500-mile, 43-day Caribbean cruise (completed in early October 1964) by the research vessel Pillsbury of the Institute of Marine Science, University of Miami.

A powerful new oceanographic tool resembling a giant echo-sounder was tested for the first time during the cruise. Weighing 6 tons and measuring 8 by 8 by 12 feet, the new device is called a seismic profiler. Its function is not only to produce a highly accurate topographical picture of the seabed, but also to reveal the layers of rock far below and what they are made of.

The seismic profiler was used while the Pillsbury was under way at about 3 knots. Electrodes set about 2 feet apart were towed behind the vessel, and a powerful electrical current (20,000 volts) was discharged every 4 seconds into the water between the electrodes. That produced a series of loud reports which were reflected from the seabed. (When operated at night, the arc of electrical energy between the two electrodes made a flash which lit up an area of ocean a mile in diameter.) Since sound waves travel through different substances at different speeds, a great deal was learned about the geological structure of the ocean basin from the various echoes recorded by sensitive microphones aboard the vessel.

The seismic profiler was used extensively during the cruise, sometimes for as long as 30 continuous hours. It was reported to have performed perfectly.

Studies of the seabed and of the rock structures below it are part of a long-range investigation by the Institute of Marine Science of the ocean basin, its sediments, and its geological structure.

Along with the seismic reflection studies, bottom samples of the rocks and sediments were obtained by grabs and by dredging and coring. Deep plankton tows were made, and specimens of living foraminifera (planktonic one-celled animals whose skeletons form much of the deep-sea bottom sediments) were taken from depths greater than 2 miles below the surface. Thousands of photographs, in both color and black-and-white, were made of the seabed with special cameras lowered on cables.

* * * * *

RESEARCH VESSEL "YAQUINA" COMMISSIONED BY OREGON STATE UNIVERSITY:

The newly converted oceanographic research vessel Yaquina began operations off the Oregon coast after being commissioned September 28, 1964, by Oregon State University. The 180-foot Yaquina has replaced the much smaller 80-foot Acona (which has been assigned to the University of Alaska) of the Department of Oceanography. The larger vessel will permit more student participation in oceanographic research; it will allow biologists to use larger nets, trawls, and dredges to greater depths; and it will expand Oregon State University programs in physical, chemical, geological, and geophysical oceanography.

The Yaquina was built in New Orleans, in 1944, as the FS-210, a sistership to the Trident and the Agassiz (U.S. Army Air Corps overhaul and maintenance vessel). At the end of World War II it was used as a reserve officer training vessel at the University of Washington for several years. It was assigned to Oregon State University by the U.S. Department of Health, Education, and Welfare and the U.S. Army Transportation Corps.

A grant of $770,000 was received from the Oceanography Program of the National Science Foundation to convert the vessel into a modern oceanographic research vessel. The conversion was done in a shipyard in Portland, Oreg. Funds to operate the vessel are being furnished by the National Science Foundation and the Geophysics Branch of the Office of Naval Research.

Statistics on the Yaquina are: length--180 feet; tonnage--gross 800, displacement 666; speed--11 knots; and range--6,500 miles, 35 days. Six scientific laboratories are located on the main deck of the vessel, and one hold has been reserved for future expansion of scientific laboratory space. Accommodations are provided on board for a complement of 40 which will include scientists and a 15- or 20-man operating crew.

Research vessel Yaquina outfitted for oceanographic investigations.

All winches on the vessel are electric. The hydrographic winch holds 30,000 feet of $\frac{3}{16}$-inch wire rope; the dredging and coring winch holds 30,000 feet of $\frac{1}{2}$-inch wire; and the trawling winch holds 20,000 feet of $\frac{3}{8}$-inch wire. The Yaquina is equipped with a retractable bow thruster powered by a 200-horsepower Diesel engine. Navy-licensed stabilizing tanks have been installed in the number

two hold. Deck equipment includes a crane on the stern, a hydraulic A-frame mounted across the stern, and a hydraulic tripod boom on the main deck. The electronic equipment carried includes 2 loran sets, 2 marine radios, 2 radar sets, a depth finder, and other navigating aids.

The vessel carries four 20-man inflatable life rafts and a workboat. Although the 22-foot gasoline-powered workboat is designed to operate in rough water, it will make up to 30 miles per hour under good conditions. It is launched with high-speed hydraulic-powered davits.

Oregon

SILVER SALMON TRANSPLANTS MAY HELP REBUILD SANDY RIVER RUNS:

Over 1,600 adult silver salmon have been transplanted in the Sandy River. Surplus hatchery salmon from the lower part of the Sandy River were transferred to upstream tributaries which contain only remnants of their once great salmon runs. The possibility of rebuilding those runs has been enhanced by improved fish passage conditions over Marmot Dam. It is hoped that the introduction of adult silver salmon of Sandy River stock will help restore the potential of the Upper Sandy River without the cost of artificial rearing. The transplanted silver salmon were obtained from surplus stocks held by the Oregon Fish Commission's Sandy River Hatchery which is located on the lower part of the river near Sandy, Oreg. The advantage of using silver salmon native to the Sandy River for the transplant is that nature has probably already provided the adaptations necessary for the water and temperature conditions in the system.

The silver salmon transplant is another step in the Oregon Fish Commission's program to enhance potential fish production by building fish ladders over barriers, clearing log jams, and transplanting fish from areas of surplus to areas of underproduction. Salmon will, with very little variation, return to their home stream to spawn, generally avoiding nearby tributaries even though they may offer excellent spawning conditions. The pattern of a salmon run can be altered by transplanting adult spawners. The resulting young are reared in a new environment and inherit the inclination to return to their own rearing water even though it is foreign to their parents. Therefore, salmon transplants seem to offer an inexpensive way to increase salmon production, provided natural conditions are favorable. (Oregon Fish Commission, September 29, 1964.)

Pesticides

RESPONSIBILITY FOR FIELD SURVEILLANCE ON EFFECTS ON FISH AND WILDLIFE:

Responsibility for field surveillance of pesticide operations to observe possible effects on fish and wildlife has been assigned to the Division of Fishery Management Services, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior. The program got under way in September 1964, following the delegation of such responsibility to that Bureau by the Secretary of the Interior. An office established by the Bureau at Fort Collins, Colo., to cover its southwest region is headed by a former official of the U.S. Public Health Service whose broad experience in this field of work will enable him to prepare statements of procedure and to assist in training other field employees in pesticide operations.

One of the first field projects in the southwest region was the spraying of lands and waters of the Yuma Proving Ground by the U.S. Air Force to control mosquitoes. The chemical or pesticide used at that time was reported as having no apparent effect on fish and wildlife.

The Bureau's Branch of Fishery Management Services also appointed a "surveillance manager" to cover its Pacific region (Alaska, Hawaii, Montana, Idaho, Washington, Oregon, California, Nevada). Observations will be made and data collected at all major pesticide projects that may have an effect on the fish and wildlife resources in those states.

In its southeast region, the Bureau will participate with the U.S. Corps of Army Engineers in its program for control of aquatic plants such as water hyacinth and alligator weed.

Radiation Preservation

FISHERY PRODUCTS IRRADIATOR AT GLOUCESTER (MASS.) DEDICATED: The Marine Products Development Irradiator dedicated on September 28, 1964, at Gloucester, Mass., is a part of the Atomic Energy Commission (AEC) program for radiation-pasteurization of food. The facility containing the irradiator is located next to the U.S. Bureau of Commercial Fisheries Technological Laboratory, Emerson Avenue, Gloucester, Mass. The fishery products irradiator is to be operated by the U.S. Bureau of Commercial Fisheries, under an agreement with the AEC, to investigate the pasteurization of fishery products.

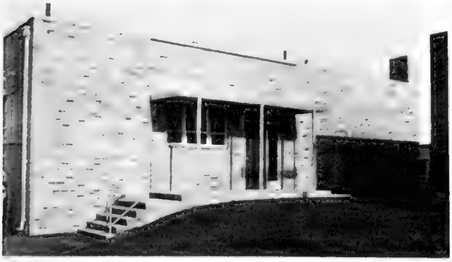


Fig. 1 - Outside view of Marine Products Development Irradiator at Gloucester, Mass.

The Marine Products Development Irradiator is a semiproduction facility with the capability of processing about 1,000 pounds of marine products at a typical pasteurization dose of 500,000 rads. (A rad is a standard unit of measurement of absorbed radiation and may be interpreted, for popular purposes, as "radiation absorbed dose.")

The cobalt-60 source employed within the shielded facility is of approximately 250,000 curies. (A curie is a standard unit of measurement used to describe the intensity of radioactivity in a given amount of radioactive material. One curie equals the radioactivity associated with one gram of radium.)

The Marine Products Development Irradiator building is a rectangular one-story building. It is divided into a general area and an irradiation cell.

The general area of 2,500 square feet includes the lobby, office, laboratory space for health physics and dosimetry, cold-storage room, filleting area, and conveyor loading area.

The irradiation cell has a gross area of 1,250 square feet. It has concrete walls more than 5 feet thick and a 4-foot-thick ceiling which has a removable plug for lowering the 7-ton lead shipping casks containing the radiocobalt into the storage well. Operations within the irradiation cell are controlled and viewed remotely with the aid of television and electrical controls.

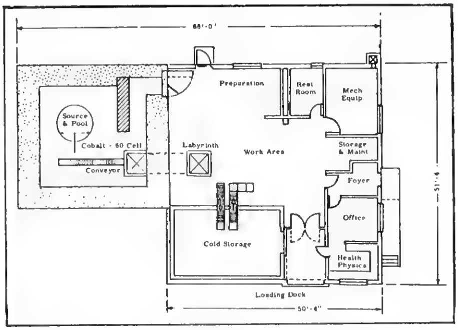


Fig. 2 - Floor plan of Marine Products Development Irradiator.

Source operation: The radiation source is raised by an elevator and is placed in a horizontal position inside an aluminum shroud between the tracks of the conveyor. It is cooled by a stream of air flowing through the shroud. The source plaque is approximately 1 foot by 4 feet and is made up of 6 subunits. When not in use, the source is stored in 15 feet of water in a stainless steel well within the irradiation chamber.

Safe operation: There are a number of safety interlocks in the irradiation cell to prevent accidental exposure of personnel to radiation from the cobalt-60 source. A number of strategically placed openings in the walls and roof can be used to introduce long-handled tools in the event of elevator malfunction. As another safety feature, the irradiation cell is kept at a lower pressure than the rest of the building. Air is drawn from the building into the cell and then is exhausted through a filter stack.

Processing: The pasteurization process can be introduced with little disturbance to commercial fish distribution procedures.

After the fish have been filleted and packed, the packages are sent through the irradiation cell. Fillets of finned fish are handled in rectangular tins holding 30 pounds of product. Shellfish, such as clams, will be packed in commercial No. 10 cans.

In the normal operation of the Marine Production Development Irradiator, the seafood packages will be brought into the building and placed on movable racks in the cold-storage room. The room has a capacity for 1.5 day's supply of incoming irradiated seafood and end product, based on a one-shift operation. As an alternate procedure, the filleting can be done inside the building (see general area).

A high-speed mechanical conveyor carries the product into the irradiation cell through a transfer tunnel. Inside the cell, the packages are transferred to a slow-moving conveyor which carries them past the radiation source. Each package makes a round trip under and over the cobalt-60 gamma ray source. It then comes out of the cell, is shifted by the operator to the other side, then goes back into the cell for a second trip. Total processing time is about one hour. The product normally receives 250,000 rads at a production rate of 2,000 pounds per hour. The dose can be reduced to 150,000 rads or less if desired, by increasing the production speed or by removing one or more of the 6 subsections into which the source is divided.

The AEC radiation-pasteurization program, of which the Marine Products Development Irradiator operation is a part, aims to develop the technology for demonstrating the practical feasibility of using relatively low doses of radiation to extend the shelf-life of selected perishable foods. Present emphasis is on fish and fruit products. In general, those will still require refrigeration, but the shipping and storage life of fish may be extended severalfold, while a significant reduction in fruit losses during transportation and marketing can be achieved. Extension of this technology to final commercial applications would be carried out by private industry.

Wholesomeness and public health safety: Studies are being carried out to determine the wholesomeness, nutritional adequacy, and safety of low-dose irradiated foods which are of interest to the AEC program. The ultimate objective is to evaluate any possible public health questions which might arise from prolonging refrigerated storage life by application of low doses of radiation.

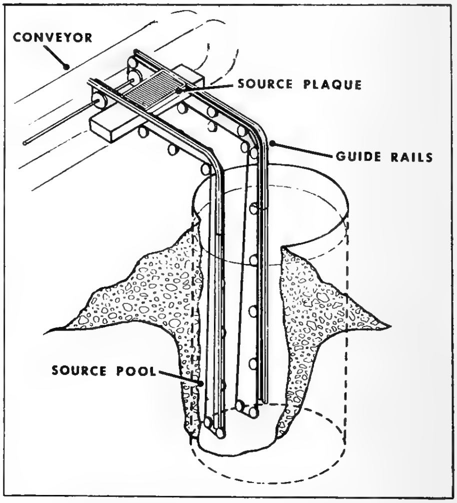


Fig. 3 - When the cobalt-60 source is not in use, it is lowered into a 16-foot stainless steel well containing a pool of water 15 feet deep. The elevator controlling the radioactive source operates not unlike an overhead garage door. The radio-cobalt plaque is in a horizontal position between the upper and lower tracks of the seafood conveyor.

The findings of these studies will be coordinated with results obtained in the Army Material Command's program on radiation-sterilization of food. These data are to be submitted in the form of petition requests to the U.S. Food and Drug Administration (FDA) for approval of low-dose irradiated foods for unlimited human consumption. Petitions for clearance of several types of lean fish--haddock, halibut, flounder, sole, cod, ocean perch, and pollock--are also to be submitted to FDA within 3 or 4 months.

FDA clearance of irradiated products represents only the removal of legal restrictions. Consumer acceptance and the development of radiation facilities are two key factors which require, and are receiving, increased attention. Food irradiation will begin to achieve some significant commercial application in the next few years, judging by current estimates. (United States Atomic Energy Commission, Washington, D.C., September 28, 1964.)

Note: See Commercial Fisheries Review, October 1964 p. 35; September 1964 p. 33.

Salmon

COOPERATIVE UNITED STATES-CANADIAN TAGGING PROGRAM:

A salmon tagging program launched by the Washington State Department of Fisheries is expected to yield information of value to Canada's Department of Fisheries. The program involves coho, chinook, and chum salmon in the vicinity of West Beach, Whidbey Island, and throughout the San Juan Islands area.

Large numbers of the "Petersen" tags used in this program are expected to be recovered in Canadian waters by Canadian fishermen. The Washington State Department of Fisheries has requested the help and cooperation of Canadian fishermen who might find the tags. The project has the support of the Department of Fisheries of Canada.

The recovered tags may be returned to Fishery Officers on the lower mainland at Vancouver Island points, or direct to the headquarters of the Canadian Department of Fisheries at 1155 Robson Street, Vancouver, B.C. Tags collected will be turned over to the Washington State Department of Fisheries. Persons returning a tag will receive a reward of 50 cents plus an additional 50 cents if information as to the time and place of the catch, the species, and other pertinent data are provided.

Sharks

SOUND WAVES OF LOW FREQUENCY MAY GUIDE SHARKS TO FOOD:

A new study indicates that sharks can use underwater sound waves to "home" in on a suspected food source--possibly including human beings--with remarkable speed and accuracy. That follows an earlier discovery that a struggling fish or a threshing swimmer may generate a "dinner bell" sound wave for cruising sharks. Those findings resulted from a continuing study of hearing and related senses in fish being conducted by a scientist at the Institute of Marine Science, University of Miami.

The study, which is supported by the National Science Foundation and the Office of Naval Research, could serve as a basis for understanding the amazing ability of fish to orient themselves in an environment that, to most humans, seems without landmarks.

The sharks tested could detect and locate the source of low-frequency sound waves when cruising over 200 yards from the sound source--far beyond visual range and with no blood in the water for sharks to smell.

Discussing sharks, the scientist in charge of the study said, "like any predatory animal, he preys most upon victims he finds easiest to catch. The easiest of these, other than a dead animal, is a cripple struggling or dying in the water. Our early experiments showed that (1) struggling fish create underwater sound waves of low frequency and these waves are transmitted in bursts as the fish struggles; (2) the frequency of these sound waves is easily within the hearing range of sharks; and (3) sharks rapidly appear near the source of such pulsed low-frequency sound waves, but do not appear when a low-frequency continuous wave or a high-frequency pulsed wave is transmitted."

During the experiments, sharks up to 14 feet long of all the commonly known kinds were repeatedly attracted by broadcasting underwater taped signals of pulsed low-frequency sounds. Predators such as barracuda, jacks, and grouper also appeared regularly.

As a result of his experiments, the University of Miami scientist believes sharks use the lower part of their hearing range, from about $7\frac{1}{2}$ to 100 cycles per second (c.p.s.), for hunting food. It was sound in that frequency range that was broadcast to sharks in experiments in the summer of 1964. It is believed that sharks can hear up to about 400 c.p.s. (The range of human hearing is between about 50 c.p.s. and 20,000 c.p.s.)

"At the outset we were not sure, however, whether sharks could swim directly to the source of the sound or whether they conducted some sort of random or organized hunting pattern that eventually brought them to the right place. The speed with which they appeared seemed to rule both methods out. But it was still a possibility.

"Also, sound transmitted underwater produces near the source an area of sound turbulence often called the 'near field effect.' Physicists have generally believed that fish could only localize a sound if they were swimming inside the turbulent sound area," the director of the shark study said.

Using a light plane to find and track sharks, and a surface vessel to transmit the "dinner call" sound wave, University of Miami inves-

tigators found that sharks were very efficient at locating the source of the sound, even when beyond the near-field effect. The sharks swam rapidly and directly to the sound source, usually staying fairly deep. When they arrived at the vessel, they stopped suddenly, 1 or 2 boat lengths away, and then swam off.

About 20 shark-tracking missions were flown during the study in the summer of 1964.

How sharks can pinpoint the location of a sound source is still not certain. In humans, part of the ability to locate particular sounds is due to the fact that the ears are set far apart. They are external and have external openings. One ear hears a sound slightly before the other one, the mind performs a subconscious problem in triangulation, other information is considered, and the answer is presented.

That process may not work in the case of sharks. The ears of a shark are set inside its cranium and are very close together. That fact, coupled with the high speed of sound waves traveling through water (1 mile per second or 5 times faster than sound in air), suggests that sharks receive all sounds in their ears almost simultaneously. A location solution through triangulation is unlikely.

According to the University of Miami scientist, it seems more probable that sharks are locating the source of a sound through a group of sensitive cells along their sides. That group of cells, called the "lateral line," has been a controversial subject among fish experts for a number of years. It is possible that their function, never certain, is connected with sound reception and orientation.

Laboratory experiments testing that theory are planned. (University of Miami, September 16, 1964.)

Shrimp

SEABED DRIFTERS RELEASED IN PINK SHRIMP MIGRATION STUDY OFF FLORIDA:

Florida fishermen may be finding bright yellow seabed drifters in their pink shrimp catch. The return of those seabed drifters with details on the time and place of capture may help explain one of the mysteries of the sea--how baby pink shrimp move from offshore spawning grounds to inshore nursery waters. Millions of pink shrimp spawn each year near the famous Dry Tortugas shrimp grounds off Florida. The baby pink shrimp presumably find their way by some mysterious means to a vast nursery ground in the Florida Everglades. But how the tiny shrimp reach the nursery, traveling against winds and currents, is a baffling problem.

The planktonic shrimp larvae are capable of only limited independent movement, so they are at the mercy of tides and currents. Do unknown bottom currents exist that sweep the shrimp larvae into the Everglades nursery? In an attempt to answer that question, the Institute of Marine Science, University of Miami, in cooperation with the U.S. Bureau of Commercial Fisheries released 240 seabed drifters during the first week of October 1964 in Florida Bay and in the Gulf of Mexico, north of the Tortugas grounds. The seabed drifters, which are yellow umbrella-shaped objects standing about 15 in-inches high, bounce along the bottom after being released, following deep-running currents. It is expected that many of the drifters will be caught in the nets of shrimp trawlers, while others may be snagged and pulled in by fishermen, or washed ashore.

Investigators need accurate information on the location of the area in which each drifter is found, together with the date of its capture. Such information will aid materially in determining the role of currents in the migrations of pink shrimp larvae.

A reward of 50 cents will be paid for each seabed drifter label returned. The reward will be paid by a U.S. Bureau of Commercial Fisheries agent at any port of landing. Labels may also be mailed to the Institute of Marine Science, University of Miami, Miami, Fla. 33149; or to the Galveston Biological Laboratory, U.S. Bureau of Commercial Fisheries, Fort Crockett, Galveston, Tex. Fishermen mailing such labels are urged to include details on the time and place of capture.

* * * * *

UNITED STATES SHRIMP SUPPLY INDICATORS, OCTOBER 1964:

Item and Period	1964	1963	1962	1961	1960
	. . . (1,000 Lbs. Heads-Off) . . .				
Total landings, So. Atl. and Gulf States:					
December	-	9,493	8,615	6,538	7,099
November	-	13,250	12,177	9,996	14,455
October	13,500	22,022	15,254	12,696	21,688
September	15,458	18,045	13,012	9,691	18,832
January-August	68,721	75,444	56,781	52,474	78,961
January-December	-	138,254	105,839	91,395	141,035
Quantity canned, Gulf States 1/:					
December	-	2,175	2,037	816	894
November	-	2,495	3,028	2,175	1,535
October	1,900	4,242	4,054	2,065	2,480
September	1,364	3,697	1,759	598	2,222
January-August	10,056	16,859	12,444	8,846	19,263
January-December	-	29,468	23,322	14,500	26,394
Frozen inventories (as of end of each mo.) 2/:					
December 31	-	45,335	31,577	19,755	40,913
November 30	-	42,142	27,500	20,668	37,264
October 31	-	37,418	21,315	17,811	31,209
September 30	22,909	27,356	12,843	13,361	24,492
August 31	21,952	24,803	12,754	12,728	20,171
July 31	24,315	25,460	13,677	14,849	17,397
June 30	25,546	24,047	13,796	19,416	15,338
Imports 3/:					
December	-	16,296	15,798	15,442	12,411
November	-	14,759	17,964	14,852	13,516
October	-	20,153	18,279	16,813	14,211
September	-	10,236	9,696	8,629	8,190
August	8,501	8,598	7,381	6,743	6,407
January-July	82,330	81,487	72,065	63,803	58,684
January-December	-	151,530	141,103	126,268	113,418
	. . .(¢/lb., 26-30 Count, Heads-Off). . .				
Ex-vessel price, all species, So. Atl. and Gulf Ports:					
December	-	59.6	82.9	75.2	54.2
November	-	52.3	84.5	73.5	54.0
October	4/64-74	53.3	90.0	68.7	53.0
September	4/62-72	57.9	90.9	70.1	52.2
August	4/60-73	59.0	83.6	66.1	52.0
July	64.5	63.5	82.1	55.8	54.6
June	66.0	77.0	84.4	53.7	64.1
May	61.1	80.9	83.7	52.8	62.9
Wholesale price, froz. brown (5-lb. pkg.), Chicago, Ill.:					
December	-	75-82	101-107	91-92	68-70
November	-	71-78	105-110	89-92	69-73
October	83-94	67-75	108-115	83-90	69-73
September	79-83	73-77	113-118	87-90	65-70
August	78-84	75-81	110-112	76-91	64-67
July	80-85	77-97	-	70-75	72-77
June	80-85	95-102	102-104	67-72	76-77
May	72-83	100-103	96-103	67-69	74-77

1/Pounds of headless shrimp determined by multiplying the number of standard cases by 30.3.
2/Raw headless only; excludes breaded, peeled and deveined, etc.
3/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
4/Range in prices at Tampa, Fla.; Morgan City, La., area; Port Isabel and Brownsville, Tex., only.
Note: October 1964 landings and quantity used for canning estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

Tennessee

ROUGH FISH REMOVAL PROGRAM, APRIL-JUNE 1964:

The removal by Tennessee commercial fishermen of 211,264 pounds of rough fish, including 54,584 pounds of carp, from eight Tennessee reservoirs and the Cumberland River in April-June 1964, was reported by the Tennessee Game and Fish Commission. The largest rough fish harvest during that period was at Kentucky Lake where 177,740 pounds of fish were taken, including 54,584 pounds of carp. Other reservoirs were Watts Bar, Fort Loudoun, Douglas, Cherokee, Chickamauga, Hales Bar, and Old Hickory. A take of 9,663 pounds of fish in the Cumberland River was recorded for the month of June only.

The rough fish removal program in most states is designed as a sport fish management tool for the benefit of the sport fisheries. Theoretically, substantial removal of rough fish should benefit sport fish production in a number of specific ways generally reflective of decreased competition for food supplies.

Tuna

AGE-GROWTH STUDIES OF BLUEFIN TUNA LANDED IN CALIFORNIA:

M/V "West Point" Tuna-Tagging Cruise (August 11-28, 1964): This cruise was the third of a series of annual tuna-tagging cruises to provide information on the age, growth, movements, and vital statistics of the Pacific bluefin tuna (Thunnus thynnus). The chartered research vessel West Point was used for this purpose by the U.S. Bureau of Commercial Fisheries Biological Laboratory, San Diego, Calif., in cooperation with the California Department of Fish and Game. Fish tagged during this cruise were distributed from Ranger Bank near Cedros Island, Baja California, Mexico, to the offshore waters of California.

Specific and more detailed objectives of the cruise included the tagging and release of bluefin tuna, collection of serological materials for subpopulation analysis, length-frequency samples of the individual catches, scale samples, stomach samples, collection of bathythermograph (BT) data relating catch success to thermocline depth and magnitude, and collateral oceanographic and meteorological observations.

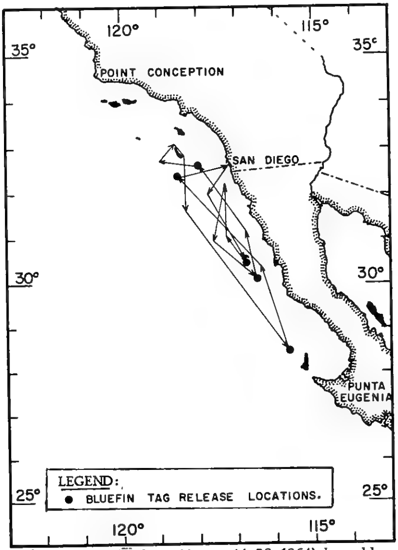
A total of 782 bluefin tuna were tagged and released during the cruise. Blood samples taken from individual bluefin tuna totaled 298 and were shipped to the Bureau's Tuna Sub-

Bluefin Tuna Tag Release Data, M/V West Point Cruise August 11-28, 1964.

Date	Time of Tagging (PDST)		Position		No. of Fish Released
	Start	Finish	Latitude	Longitude	
1964					
August 13	1840	1910	30°30' N.	116°45' W.	96
August 14	0250	0310	30°25' N.	116°45' W.	137
August 17	1640	1655	30°09' N.	116°28' W.	17
August 20	0615	0655	32°41' N.	117°55' W.	247
August 24	1355	1412	28°34' N.	115°42' W.	153
August 27 1/	1020	1040	32°25' N.	118°12' W.	132
Total					782

1/Recovered one tag released August 13, 1964.

population Study group at Honolulu, Hawaii, for serological analyses. Scale samples were obtained from 248 fish.



Cruise track of West Point (August 11-28, 1964) shows bluefin tuna tag release locations.

Supplementary data obtained on the cruise included 15 BT casts at or near the time the purse seine was fished, length-frequency data from all catches, and daily synoptic marine meteorological observations at 0000 and 1800 GMT. Other species taken by the purse seine were: blue shark (*Prionace glauca*), dolphin (*Coryphaena hippurus*), and sunfish (*Mola mola*).

Note: See Commercial Fisheries Review, January 1964 p. 31.

* * * * *

BLUEFIN TUNA TAGGED OFF MEXICO RECAPTURED NEAR JAPAN:

A bluefin tuna tagged and released 70 miles northeast of Guadalupe Island, Baja California, was caught 22 months later in the Sea of Japan. The tag and complete recovery information was sent to the California Department of Fish and Game by the Japanese Government.

The fish was tagged and released by a joint research team of the California Department of Fish and Game and U.S. Bureau of Commercial Fisheries on August 15, 1962, and was recaptured June 18, 1964, in a trap operated by Japanese fishermen near the coastal town of Fukaura, Honshu.

In the meantime, the bluefin traveled 4,820 miles and grew from 23 pounds to 53 pounds. It was tagged as a one-year old fish and was recovered at the age of three years.

This fish was the first return from Japan of a group of 960 bluefin tuna tagged by State and Federal scientists in 1962 near the coast of southern California and Baja California. Some 168 tags from that group had been turned in by California fishermen.

The first proof that bluefin tuna migrate between California and the Japanese coast came on April 23, 1963, when a tuna tagged off California by the Inter-American Tropical Tuna Commission five years previously was caught by a Japanese long line fisherman. It weighed 35 pounds when tagged and weighed in at 242 pounds (gutted and gilled) when recaptured. (Outdoor California, September 1964.)

Another bluefin tuna, also tagged by biologists of the California Department of Fish and Game, was caught on August 17, 1964, by a Japanese fisherman in waters about 300 miles north of Tokyo. The fish had been tagged and released in Mexican offshore wa-

ters near Guadalupe Island on August 15, 1962, and then weighed about 22 pounds. When it was recovered two years later it weighed 67 pounds and had traveled nearly 10,000 miles. It was the third United States-tagged bluefin tuna caught near Japan.

Note: See Commercial Fisheries Review, August 1963 p. 53.

U. S. Coast Guard

NEW SEARCH AND RESCUE VESSEL "VIGILANT":

The Vigilant, a new search and rescue vessel of the U.S. Coast Guard arrived at its home port of New Bedford, Mass., on October 12, 1964, following a cruise from Houston, Tex., where it was built and commissioned. The Vigilant's mission will be search and rescue off New England. Much of the time, when not on an actual assistance case, the vessel will be assigned to the Provincetown (Mass.) patrol--a search and rescue standby patrol maintained primarily for the safety of United States fishing vessels on George's Bank and for other offshore vessels in that area.

The Vigilant's first search and rescue case began October 5, 1964, only one day after the cutter departed Houston for New Bedford. The Little Creek, a 42-foot fishing vessel with 2 men on board, was foundering in 15-foot seas in the Gulf of Mexico. The Vigilant changed course, raced to the scene, took the distressed vessel in tow, and carried it into Tampa, Fla., on October 6.

The Vigilant, newest search and rescue cutter of the U.S. Coast Guard. The 210-foot vessel has a deck suitable for carrying amphibious helicopters, although none will be carried on routine assignments.

The Vigilant is 210 feet long. It is capable of sustained speed of 18 knots and has a cruising radius of 5,000 miles at 15 knots. It can tow ships of up to 10,000 gross tons. Innovations on the vessel include a helicopter deck and rapid-release boat davits which can put surfboats in the water in $9\frac{1}{2}$ seconds. The surfboats are consturcted of plastic and are gas-turbine powered.

The Vigilant is the third 210-foot medium-endurance cutter to be built in the U.S. Coast Guard's fleet modernization program. The program has scheduled 38 modern search and rescue cutters to be built during the next 10 years. Included in the program will be 350-foot high-endurance cutters, which will be the longest cutters ever built by the Coast Guard. They will be capable of 29 knots and will be highly maneuverable.

United States Fisheries

COMMERCIAL FISHERY LANDINGS, JANUARY-SEPTEMBER 1964:

Total Landings: The U. S. catch of fish and shellfish in 1964 (mostly for the first 9 months and in some instances various periods through October 23) was down about 9 percent as compared with the same period in 1963. Landings were about 301 million pounds less than in 1963--due chiefly to reduced landings of menhaden, Maine herring, Atlantic ocean perch, jack and Pacific mackerel, and shrimp. Landings of industrial fish were down 193 million pounds and food fish down 108 million pounds.

Menhaden: Landings of menhaden to September 30, 1964, totaled 1.3 billion pounds--202 million pounds less than during the same period in 1963. The decline occurred principally in the Middle Atlantic States (down 207 million pounds) and the Gulf States (down 25 million pounds).

Salmon: On the basis of the reported pack of canned salmon, it is estimated that the 1964 catch in Alaska was approximately 312 million pounds--an increase of 89 million pounds or 40 percent compared with 1963.

Tuna: Landings in California to October 17, 1964, were 236 million pounds--down slightly from the 238 million pounds taken during the same period in 1963. The combined catch of albacore, bluefin, and skipjack tuna declined about 19 million pounds, while landings of yellowfin increased by nearly the same amount.

Ocean perch: During the first 9 months of 1964, landings in Massachusetts totaled 26 million pounds (down about 11 million pounds from the previous year); while Maine landings

Modern California tuna purse seiner, the Nautilus. This vessel, a converted Navy mine layer, is 189 feet long.

United States Commercial Fishery Landings of Certain Species for Periods Shown, 1964 and 1963

Species	Period	1/1964	1963	Total 1963
		......(1,000 Lbs.)......		
Cod:				
Maine	8 mos.	1,900	1,580	1,960
Mass. 2/	9 "	20,600	25,241	31,475
Total cod		22,500	26,821	33,435
Flounder:				
Maine	8 mos.	800	1,005	1,216
Mass.	9 "	68,300	69,315	91,876
Total flounder		69,100	70,320	93,092
Haddock:				
Maine	8 mos.	2,000	1,642	2,878
Mass. 2/	9 "	93,400	88,481	106,075
Total haddock		95,400	90,123	108,953
Halibut: 3/				
Alaska	9 mos.	16,500	21,778	22,372
Wash. & Oreg.	9 "	8,600	11,050	11,871
Total halibut........		25,100	32,828	34,243
Herring, Maine	8 mos.	35,700	108,061	152,317
Industrial fish (Me. & Mass.) 4/	9 mos.	24,200	43,341	47,897
Mackerel:				
Jack 5/	9 mos.	58,400	67,054	98,078
Pacific 5/	9 "	18,300	22,722	36,974
Menhaden	9 mos.	1,316,100	1,517,674	1,815,801
Ocean perch:				
Maine	8 mos.	38,500	46,353	63,905
Mass.	9 "	25,900	37,231	44,387
Total ocean perch		64,400	83,584	108,292
Pollock:				
Maine	8 mos.	900	1,934	2,489
Mass. 2/	9 "	6,400	6,450	10,727
Total pollock		7,300	8,384	13,216
Salmon, Alaska	Year	311,800	223,063	223,063
Sardine, Pacific	to Oct. 23	10,500	6,673	7,128
Scallops, sea, New Bedford (meats)	9 mos.	10,300	13,033	15,941
Shrimp (heads-on), So. Atl. & Gulf	9 mos.	133,800	148,648	218,645
Tuna, Calif.	to Oct. 17	235,700	237,994	285,285
Whiting:				
Maine	8 mos.	24,900	15,889	16,942
Mass.	9 "	40,600	53,782	64,571
Total whiting		65,500	69,671	80,513
Total all above items		2,504,100	2,769,994	3,372,873
Other 6/		567,200	602,429	1,467,127
Grand total		3,071,300	3,372,423	4,840,000

1/Preliminary.
2/Landed weight.
3/Dressed weight.
4/Excludes menhaden.
5/Cannery receipts.
6/Includes landings for species not listed.
Note: Finfish generally converted to round weight, crustaceans to weight in the shell, and mollusks reported in meats only.

for the first 8 months of 1964 were 38 million pounds--a decrease of 8 million pounds.

Shrimp: Landings in the South Atlantic and Gulf States declined to 134 million pounds through September 1964 as compared with 149 million pounds during the same 1963 period.

Mackerel: Landings of jack mackerel through September 1964 amounted to 58 million pounds, while landings of Pacific mackerel totaled 18 million--a decline of about 9 and 4 million pounds, respectively, compared with the same period of 1963.

Maine herring: The catch of Maine herring during the first 8 months of 1964 totaled 36 million pounds--a sharp decline from the 108 million pounds in 1963.

U. S. Fishing Vessels

NEW SWORDFISH VESSEL "CHILMARK SWORD" DELIVERED:

In mid-September 1964, the 83-foot steel vessel Chilmark Sword was delivered to her Massachusetts owners by a Rhode Island shipyard. The $150,000 vessel is said to be the first vessel specifically designed for the swordfish long-line fishery. It carries 20 miles of nylon-polypropylene long line. Accessories for the long line include fifty 10-foot poles with radar reflectors, and several hundred rubber buoys.

At the start of fishing operations, the long line is slowly fed out the rear of the Chilmark Sword. At 50-foot intervals the line is crossed with 10-foot secondary lines to which hooks are attached. The hooks are usually baited with mackerel chunks or squid.

The long line is left out for several hours. It is then located with special radar equipment if necessary, and hauled mechanically. The hauling mechanism pulls aboard the vessel the long line, coiling the rope neatly in some 200 galvanized tubs.

Each swordfish taken on the long line is gutted at the edge of the vessel and stored immediately in a plywood-fiberglass hold with a capacity of 50 tons.

Before delivery the vessel was taken on a 12-day trial voyage during which 80 swordfish averaging more than 200 pounds each were caught.

The Chilmark Sword is powered by a 450-horsepower engine. It is equipped with an automatic pilot, and also has controls which allow the skipper to run the vessel from either side of the bridge while hauling in the long line.

The owners of the Chilmark Sword have a similar vessel, the Chilmark Voyager, under construction. (Boston Globe, September 22, 1964.)

* * * * *

DOCUMENTATIONS ISSUED AND CANCELLED:

August 1964: During August 1964, a total of 41 vessels of 5 net tons and over were issued first documents as fishing craft, as compared with 62 in August 1963. There were 30 documents cancelled for fishing vessels in August 1964, as compared with 23 in August 1963.

Table 1 - U. S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, August 1964 with Comparisons

Area (Home Port)	August 1964	August 1963	Jan.-Aug. 1964	Jan.-Aug. 1963	Total 1963
	. . . . . (Number)				
Issued first documents 2/:					
New England	-	3	24	17	23
Middle Atlantic	1	3	6	15	18
Chesapeake	2	6	26	37	66
South Atlantic	5	7	35	51	77
Gulf	22	35	164	170	239
Pacific	11	7	114	143	160
Great Lakes	-	1	1	4	5
Hawaii	-	-	1	-	-
Puerto Rico	-	-	1	2	2
Total	41	62	372	439	590
Removed from documentation 3/:					
New England	3	5	23	38	48
Middle Atlantic	1	2	11	41	47
Chesapeake	1	1	12	13	25
South Atlantic	4	6	19	43	53
Gulf	11	2	50	78	118
Pacific	9	5	96	65	87
Great Lakes	1	2	7	11	15
Hawaii	-	-	-	1	3
Total	30	23	218	290	396

Note: For explanation of footnotes, see table 4.

Table 2 - U.S. Fishing Vessels--Documents Issued by Vessel Length and Area, August 1964 2/

Length in feet	Middle Atlantic	Chesapeake	South Atlantic	Gulf	Pacific	Total
	. . . . . . (Number)					
29 - 29.9	-	-	1	-	1	2
30 - 30.9	-	-	-	-	1	1
31 - 31.9	-	-	-	1	-	1
32 - 32.9	-	-	-	1	2	3
33 - 33.9	-	1	-	2	-	3
35 - 35.9	-	-	-	2	-	2
36 - 36.9	-	-	-	1	-	1
37 - 37.9	-	-	-	1	2	3
39 - 39.9	-	-	-	2	1	3
40 - 40.9	-	-	-	1	-	1
41 - 41.9	-	-	-	2	2	4
43 - 43.9	-	1	-	-	-	1
45 - 45.9	-	-	-	-	1	1
48 - 48.9	-	-	1	-	-	1
49 - 49.9	-	-	-	-	1	1
50 - 50.9	-	-	1	-	-	1
59 - 59.9	-	-	-	1	-	1
60 - 60.9	1	-	-	-	-	1
61 - 61.9	-	-	1	-	-	1
62 - 62.9	-	-	-	3	-	3
64 - 64.9	-	-	-	1	-	1
65 - 65.9	-	-	-	3	-	3
66 - 66.9	-	-	1	-	-	1
67 - 67.9	-	-	-	1	-	1
Total	1	2	5	22	11	41

Note: For explanation of footnote, see table 4.

Table 3 - U.S. Fishing Vessels--Documents Issued by Tonnage and Area, August 1964 2/

Gross Tonnage	Middle Atlantic	Chesapeake	South Atlantic	Gulf	Pacific	Total
	. . . . . .(Number). . . .					
5 - 9	-	2	1	-	-	3
10 - 19	-	-	-	10	6	16
20 - 29	-	-	-	3	-	3
30 - 39	-	-	2	-	4	6
50 - 59	1	-	-	-	1	2
60 - 69	-	-	1	4	-	5
70 - 79	-	-	-	4	-	4
80 - 89	-	-	1	1	-	2
Total	1	2	5	22	11	41

Note: For explanation of footnote, see table 4.

Table 4 - U.S. Fishing Vessels--Documents Issued by Vessel Horsepower and Area, August 1964 2/

Horsepower	Middle Atlantic	Chesapeake	South Atlantic	Gulf	Pacific	Total
	. . . . . (Number).					
30 - 39	-	-	-	-	2	2
40	-	-	-	-	1	1
62	-	-	1	-	-	1
80	-	-	-	1	-	1
90 - 99	-	1	-	1	-	2
100 - 109	-	-	-	-	2	2
110 - 119	-	-	-	4	-	4
120 - 129	-	1	-	1	-	2
130	-	-	-	1	-	1
150	1	-	-	-	-	1
160 - 169	-	-	2	3	2	7
170	-	-	-	2	-	2
190	-	-	-	1	-	1
220 - 229	-	-	-	5	2	7
245	-	-	-	-	1	1
300	-	-	-	2	-	2
320	-	-	-	1	-	1
330 - 339	-	-	2	-	1	3
Total	1	2	5	22	11	41

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/There were no redocumented vessels in August 1964 previously removed from the records. Vessels issued first documents as fishing craft were built: 33 in 1964; 2 in 1963; 1 in 1962; and 5 prior to 1946.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U. S. Treasury Department.

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS, JANUARY-JUNE 1964:

Airborne fishery imports into the United States in June 1964 were more than double those in the previous month. The increase was due mainly to heavier imports of shrimp from Venezuela and the arrival of volume shipments of live northern lobsters from Canada.

U. S. 1/Airborne Imports of Fishery Products, January-June 1964 with Comparative Data

Product and Origin 2/	1964 June Qty. 3/	1964 June Value 4/	1964 Jan.-June Qty. 3/	1964 Jan.-June Value 4/	1963 Jan.-June Qty. 3/	1963 Jan.-June Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	77.6	11.3	228.5	53.2	148.7	45.9
British Honduras	-	-	1.8	0.4	33.9	8.6
Honduras	-	-	-	-	16.5	4.3
Japan	-	-	-	-	2.0	8.2
United Kingdom	-	-	1.9	3.6	1.4	3.6
Iran	-	-	-	-	1.2	7.4
France	-	-	4.3	7.8	0.7	0.6
Rumania	0.9	9.0	0.9	9.0	-	-
Venezuela	-	-	4.6	1.7	-	-
Ireland	0.3	0.3	0.6	0.6	0.8	0.3
Denmark	0.3	0.8	0.6	1.2	-	-
Canada	1.6	0.5	14.8	4.8	-	-
Spain	1.4	1.3	3.2	2.7	-	-
Other countries	-	-	3.2	2.1	-	-
Total fish	82.1	23.2	264.4	87.1	205.2	78.9
Shrimp:						
Guatemala	-	-	-	-	137.7	72.1
El Salvador	-	-	159.1	96.8	198.1	135.9
Honduras	-	-	-	-	22.7	11.9
Nicaragua	24.7	13.6	71.9	41.2	308.7	101.6
Costa Rica	24.6	17.4	188.3	108.1	310.7	150.3
Panama	99.0	60.6	512.1	309.4	882.7	474.2
Venezuela	435.4	217.1	2,162.1	984.1	2,511.2	1,234.9
Ecuador	-	-	-	-	111.6	39.4
France	-	-	-	-	2.6	0.9
British Guiana	-	-	10.5	5.2	-	-
Mexico	-	-	-	-	5.0	1.8
Other countries	0.7	1.0	0.9	1.1	-	-
Total shrimp . . .	584.4	309.7	3,104.9	1,545.9	4,491.0	2,223.0
Shellfish other than shrimp:						
Mexico	-	-	9.0	4.8	73.0	42.6
British Honduras	-	-	82.8	50.4	108.9	78.5
El Salvador	-	-	-	-	5.0	3.6
Honduras	-	-	12.9	9.4	1.9	1.0
Nicaragua	-	-	50.5	40.0	81.0	54.4
Costa Rica	-	-	9.3	9.5	73.8	60.1
Jamaica	-	-	43.6	36.2	51.0	40.1
Netherlands Antilles	-	-	-	-	32.8	20.9
Colombia	-	-	-	-	7.7	21.3
Ecuador	-	-	-	-	2.2	1.8
Tunisia	-	-	-	-	0.8	0.9
British Guiana	-	-	14.5	3.2	1.7	0.3
Canada	206.6	112.1	207.8	113.0	196.6	101.2
Venezuela	-	-	-	-	13.7	6.0
Dominican Republic	0.4	0.4	7.8	1.5	13.5	11.7
Bahamas	-	-	10.6	6.8	-	-
Haiti	0.5	0.5	5.6	3.1	-	-
Other countries	0.1	0.1	0.5	0.6	3.5	3.3
Total shellfish (excl. shrimp)	207.6	113.1	454.9	278.5	667.1	447.7
Grand total	874.1	446.0	3,824.2	1,911.5	5,363.3	2,749.6

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight or insurance.
Note: These data are included in the overall import figures for total imports, i.e., these imports are not to be added to other import data published.
Source: United States Airborne General Imports of Merchandise, FT 380, June 1964, U. S. Bureau of the Census.

Total airborne shrimp imports in June 1964 consisted of 559,041 pounds of fresh and frozen raw headless and 25,376 pounds of unclassified shrimp. About 93 percent of the airborne shrimp arrivals in June 1964 entered through the Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Galveston (Tex.), Los Angeles (Calif.), and New York (N. Y.).

Fish fillets from Mexico accounted for the bulk of the airborne finfish imports in June 1964. The June imports, however, included 900 pounds of caviar from Rumania valued at almost $9,000, which entered through the Customs District of San Francisco (Calif.).

Total airborne fishery imports in January-June 1964 were down 28.7 percent in quantity and 30.5 percent in value from those in the same period of 1963. The decline was due to smaller shipments of shrimp and spiny lobsters from Central and South American countries.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products.

* * * * *

PROCESSED EDIBLE FISHERY PRODUCTS, AUGUST 1964:

United States imports of processed edible fishery products in August 1964 were up 8.1 percent in quantity and 8.4 percent in value from those in the previous month, due mainly to larger imports of cod fillets, groundfish blocks (increase mainly from Iceland and Greenland), and canned sardines not in oil (increase mainly from the South Africa Republic). The increase was partly offset by smaller imports of haddock fillets, ocean perch fillets, and flounder fillets.

Compared with the same month in 1963, imports in August 1964 were up 2.4 percent in quantity and 4.7 percent in value. This August there were larger imports of canned albacore tuna in brine, canned sardines not in oil, canned lobster, halibut fillets, and yellow pike fillets. But imports were down for groundfish fillets (decline mainly from Canada), swordfish fillets, canned crabmeat, and canned oysters.

In January-August 1964, imports were up 3.6 percent in value from those in January-August 1963, but the quantity of the imports was almost the same for both periods. During January-August 1964, there was a sizable increase in imports of groundfish fillets and blocks (increase mainly from Canada and Iceland), flounder fillets, yellow pike fillets, and sea catfish fillets. But there was a considerable decline in imports of canned tuna, canned crab meat, and swordfish fillets.

U.S. Imports and Exports of Processed Edible Fishery Products, August 1964 with Comparisons

Item	Quantity August 1964	Quantity August 1963	Quantity Jan.-Aug. 1964	Quantity Jan.-Aug. 1963	Value August 1964	Value August 1963	Value Jan.-Aug. 1964	Value Jan.-Aug. 1963
	. . (Millions of Lbs.)				. (Millions of $) . .			
Fish & Shellfish:								
Imports1/. . .	52.0	50.8	344.0	342.9	15.5	14.8	103.2	99.6
Exports2/. . .	4.5	1.6	28.1	20.0	2.9	0.9	13.3	8.5

1/Includes only those fishery products classified by the U.S. Bureau of Census as "Manufactured foodstuffs." Included are canned, smoked, and salted fishery products. The only fresh and frozen fishery products included are those involving substantial processing, i. e., fish blocks and slabs, fish fillets, and crab meat. Does not include fresh and frozen shrimp, lobsters, scallops, oysters, and whole fish (or fish processed only by removal of heads, viscera, or fins, but not otherwise processed).
2/Excludes fresh and frozen.

Exports of processed edible fish and shellfish from the United States in August 1964 were up 60.7 percent in quantity and 107.1 percent in value from those in the previous month. Heavy August shipments of canned salmon--totaling 2.3 million pounds and going mainly to the United Kingdom--accounted for most of the increase.

Compared with the same month of the previous year, the exports in August 1964 were up 181.3 percent in quantity and 111.1 percent in value. Again, the increase was due mainly to larger shipments of canned salmon. Exports were also up for canned squid (principally to Greece and the Philippines) and canned shrimp (principally to Canada and the United Kingdom). But exports were down for canned mackerel and canned sardines.

Processed fish and shellfish exports in the first 8 months of 1964 were up 40.5 percent in quantity and 56.5 percent in value from those in the same period of 1963. In January-August 1964 there were much larger shipments of canned mackerel, canned salmon, and canned sardines in oil. Exports of canned shrimp were also higher, but exports of canned sardines not in oil and canned squid were down.

Notes: (1) Prior to October 1963, the data shown were included in news articles on "U. S. Imports and Exports of Edible Fishery Products." Before October 1963, data showing "U. S. Imports of Edible Fishery Products" summarized both manufactured and crude products. At present, a monthly summary of U. S. imports of crude or nonprocessed fishery products is not available; therefore, only imports of manufactured or processed edible fishery products are reported above. The above import data are, therefore, not comparable to previous reports of "U. S. Imports of Edible Fishery Products."

The export data shown are comparable to previous data in "U. S. Exports of Edible Fishery Products." The export data in this series of articles have always been limited to manufactured or processed products.

(2) See Commercial Fisheries Review, Nov. 1964 p. 63.

Washington

EXCESSIVE FISHING DAMAGES CHINOOK SALMON RUN IN YAKIMA RIVER:

Almost all of the chinook salmon run to the Yakima River in the fall of 1964 was taken in the nets of Indian fishermen, according to the Director of the Washington State Department of Fisheries. From a run of over 3,000 fish, less than 100 salmon survived to reach the spawning ground. If the surviving spawners reproduce at the same 3-for-1 rate that their parents did, the entire chinook salmon run returning 4 and 5 years from now to the Yakima River from the 1964 spawning will be no more than 300 fish.

There is no doubt that a treaty guarantees the Indians the right to fish and regulate their fishery on their Reservation on the Yakima River. There is also no doubt that the treaty does not guarantee them a healthy run of fish for their harvest. The Yakima Indians have fishing regulations, but their management failed to protect the spawning stock in 1964. The primary purpose of salmon fishing regulations should be to let adequate seed stock get through to the spawning ground.

The Yakima River has a good salmon potential in spite of diverse water use. The Washington State Department of Fisheries has spent considerable sums to rear fish and rehabilitate upstream spawning areas. Other ways to increase the spawning potential are also known, but sufficient salmon must be allowed upstream as a first important step. (Washington State Department of Fisheries, September 28, 1964.)

Wholesale Prices

EDIBLE FISH AND SHELLFISH, OCTOBER 1964:

Prices were generally higher from September to October 1964 and the overall wholesale price index for edible fishery products rose 1.7 percent from the previous month. The more significant price changes in October were principally for haddock and shrimp. At 111.6 percent of the 1957-59 average, the index this October was 4.5 percent higher than in the same month of 1963.

A 3.3-percent increase from September to October in the subgroup index for drawn, dressed, or whole finfish was due largely to higher ex-vessel prices at Boston for large haddock. Because of light haddock landings, October prices were up 22.2 percent from the previous month and were higher than in October 1963 by 30.3 percent. Prices at New York City for fresh and frozen halibut were somewhat higher in October (up 0.9 percent) because of the strong demand for the fresh product. As the seasonal Pacific Northwest halibut fishery came to a close, fresh halibut was in limited supply and much higher-priced than the frozen product. Compared with October 1963, halibut prices this October were 26.3 percent higher. An in-

A modern fish and seafood retail counter in Kansas City, Mo.

crease in prices at Chicago for Lake Superior fresh whitefish (up 12.6 percent) this October was offset by lower prices for fresh round yellow pike (dropped 13.7 percent from the previous month). As compared with October 1963, the subgroup index this October was 9.7 percent higher because of the higher halibut prices and sharply higher prices for ex-vessel large haddock.

The subgroup index for processed fresh fish and shellfish dropped 0.8 percent from September to October because of higher prices at New York City for South Atlantic fresh shrimp (up 1.3 percent). October 1964 prices for other items in the subgroup ranged from slightly to substantially lower than in September, but those lower prices were mostly cancelled out by the more significant (although relatively small) price increase for shrimp. As compared with October 1963, the subgroup index this October was 0.1 percent lower because of lower prices for fresh haddock fillets (down 14.9 percent) and shucked standard oysters (down 6.6 percent), but shrimp prices were up 10 percent from the same month in 1963.

A 4.7-percent increase from the previous month in the October 1964 processed frozen fish and shellfish subgroup index resulted largely from a fairly sharp rise in frozen shrimp prices (wholesale price up 6 cents a pound) at Chicago. Prices this October also were higher for frozen haddock fillets, while

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1964 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Oct. 1964	Sept. 1964	Oct. 1964	Sept. 1964	Aug. 1964	Oct. 1963
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					111.6	2/109.7	105.4	106.8
Fresh & Frozen Fishery Products:					116.6	2/113.7	106.9	110.0
Drawn, Dressed, or Whole Finfish:					133.4	2/129.1	114.6	121.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.17	.14	135.5	110.9	83.3	104.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.56	.55	164.1	2/162.7	122.7	129.9
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.96	.98	134.1	136.2	129.2	132.7
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.54	.48	79.8	70.9	78.3	78.3
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.48	.55	77.8	90.1	88.4	83.5
Processed, Fresh (Fish & Shellfish):					106.5	107.4	101.1	106.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.40	.44	97.1	106.9	86.2	114.1
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.83	.82	96.7	95.5	89.6	87.9
Oysters, shucked, standards	Norfolk	gal.	7.13	7.25	120.1	122.2	118.0	128.6
Processed, Frozen (Fish & Shellfish):					104.7	100.0	100.0	97.5
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.36	.37	91.2	92.5	95.0	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.38	.37	109.9	108.5	108.5	114.3
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.30	.30	103.4	103.4	106.9	118.4
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.87	.81	103.2	95.5	94.9	86.0
Canned Fishery Products:					103.1	103.1	103.1	101.7
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	21.75	21.75	94.8	94.8	97.0	102.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.56	11.56	102.6	102.6	102.6	96.6
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	6.25	6.25	105.9	105.9	105.9	97.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.00	10.00	128.3	128.3	119.4	113.3

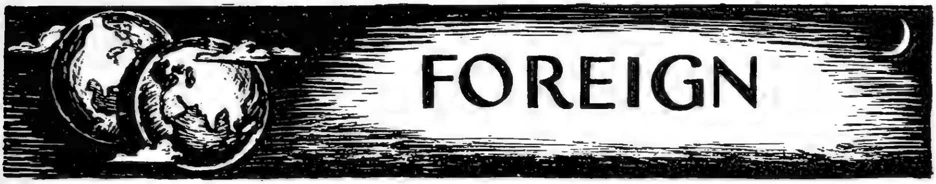
1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/Revised by Bureau of Labor Statistics.

other species of frozen fillets were slightly lower-priced or the same as in the previous month. As compared with October 1963, the subgroup index this October was higher by 7.4 percent. October 1964 frozen shrimp prices were 20 percent higher than in the same month a year earlier but those for all other items in the subgroup were lower than in October 1963.

October 1964 wholesale prices for canned fishery products listed in the index were the same as in the previous month and the subgroup index at 103.1 percent of the 1957-59 average remained unchanged for the third consecutive month. The market for canned fishery products continued to be highlighted by liberal supplies of Alaska canned pink salmon. By contrast, supplies of canned Maine sardines were very low because of the disappointing new season pack which was nearly completed and not expected to total more than about half the 1963 pack. Canned fish prices this October were mostly up from those in October 1963 and the index was higher by 1.4 percent. The only exception was canned salmon (prices 7.4 percent lower than in October 1963).

CORRECTION

In the October 1964 issue, in the article "Comparison of Salmon Catches in Monofilament and Multifilament Gill Nets--Part II," on page 6 in Table 5 under (e), the symbol following "Relative cost/year/fish" should read "z/w" instead "2/w."



International

FISH MEAL

PRODUCTION AND EXPORTS FOR SELECTED COUNTRIES, JANUARY-AUGUST 1963-1964:

Member countries of the Fish Meal Exporters' Organization (FEO) account for about 90 percent of world exports of fish meal. The FEO countries are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa. Production and exports of fish meal by FEO countries during January-August 1964 were up substantially from the same period of the previous year. During the first 8 months of 1964, Peru accounted for about 68.1 percent of total fish meal exports reported by FEO countries.

Table 1 - Exports of Fish Meal by Member Countries of the FEO, January-August 1963-1964

Country	July		August		Jan.-Aug.	
	1964	1963	1964	1963	1964	1963
	. . . . (1,000 Metric Tons)					
Chile	16.4	2.1	1/	2.1	2/ 87.0	74.4
Angola	1.9	0.1	1/	1.5	2/ 32.1	16.2
Iceland	13.4	7.6	11.4	5.7	77.8	50.5
Norway	12.0	3.9	12.0	5.4	129.2	50.9
Peru	141.6	110.3	141.6	83.1	1,016.4	807.7
So. Africa (including S.-W. Africa)	20.2	17.9	20.2	15.6	150.2	106.0
Total	205.5	141.9	185.2	113.4	1,492.7	1,105.7

Note: For explanation of footnotes, see table 2.

Table 2 - Production of Fish Meal by Member Countries of the FEO, January-August 1963-1964

Country	July		August		Jan.-Aug.	
	1964	1963	1964	1963	1964	1963
	. . . . (1,000 Metric Tons)					
Chile	6.3	25.2	1/	1.2	97.3	72.6
Angola	1.0	1.1	1/	2.0	31.5	16.1
Iceland	20.3	6.3	13.4	18.2	86.6	64.1
Norway	15.0	25.2	15.0	18.3	134.7	88.6
Peru	83.8	39.2	83.8	38.1	1,009.6	778.8
So. Africa (including S.-W. Africa)	30.2	29.2	30.2	19.3	213.1	195.3
Total	156.6	126.2	142.4	97.1	1,572.8	1,215.5

1/Data not available.
2/Data only available for January-July.

* * * * *

WORLD PRODUCTION, JULY-AUGUST 1964:

World fish meal production in July and August 1964 was down somewhat from the average monthly output in the first half of 1964. There was a seasonal decline in output in Peru which is the major producing country. But world production in both July and August 1964 was up substantially from that in the same months of 1963.

World fish meal production in the first 8 months of 1964 was considerably above that in the same period of 1963. The increase was due largely to expanded production in Peru which accounted for about 51 percent of world output during January-August 1964. Higher production during January-August 1964 was also reported in Norway, South Africa, Chile, Iceland, and Angola. The increase was partly offset by lower production in Canada and the United States.

World Fish Meal Production by Countries, January-August 1963-1964

Country	July		August		Jan.-Aug.	
	1964	1963	1964	1963	1964	1963
	. . . . . (Metric Tons)					
Canada	8,778	5,335	5,999	3,290	36,711	46,535
Denmark	11,703	11,497	16,398	11,024	69,951	69,965
France	1,100	1,100	1,100	1,100	8,800	8,800
German Fed. Republic	5,621	5,632	7,757	6,035	50,655	50,616
Netherlands	1/	600	1/	900	2/3,500	3,500
Spain	1/	1,790	1/	2,075	1/	14,734
Sweden	164	224	581	532	4,411	3,863
United Kingdom	6,985	7,250	5,770	6,065	53,038	52,164
United States	37,792	34,916	28,918	39,068	147,690	3/156,577
Angola	956	1,078	1/	1,954	4/31,498	16,494
Iceland	20,284	6,316	13,389	18,176	86,552	64,060
Norway	15,020	25,255	19,703	18,256	134,558	87,999
Peru	83,798	39,240	56,112	38,098	1,009,592	778,845
So. Afr. (incl. S.W. Afr.)	30,419	30,487	24,480	18,170	218,492	196,654
Belgium	375	375	375	375	3,000	3,000
Chile	6,318	3,565	6,161	1,219	103,459	72,581
Morocco	1/	1/	1/	1/	5/4,060	1/
Total	229,313	174,660	186,743	166,337	1,965,967	1,626,387

1/Data not available.
2/Data available only for Jan.-June 1964
3/Revised.
4/Data available only for Jan.-July 1964.
5/Data available only for Jan.-May 1964.
Note: Japan does not report fish meal production to the International Association of Fish Meal Manufacturers at present.

Most of the principal countries producing fish meal submit data to the Association monthly (see table).

INTERNATIONAL ASSOCIATION OF FISH MEAL MANUFACTURERS

FIFTH ANNUAL CONFERENCE:

The 5th Annual Conference of the International Association of Fish Meal Manufacturers was held in Vienna, Austria, September 29-October 2, 1964. This private organization of associations representing the fish meal industry and individual manufacturing companies was organized in 1959 and has its headquarters in London, England.

International (Contd.):

Some 108 delegates and observers from about 20 countries, representing nearly all of the 17 member countries, together with observers from Japan and Mexico attended the Conference. Other observers were from the Food and Agriculture Organization (FAO), U. S. Bureau of Commercial Fisheries, and the Fish Meal Exporters Organization (FEO).

Scientists were strongly represented in the delegations, all of whom were authorities on fish meal and the fishing industry, either on an international basis or in their own countries. In all, 29 scientists from most of the participating countries met in the Scientific Committee. For the first time, 70 representatives (agents, brokers, and importers) from private industry took part in the opening and closing sessions of the Conference, and part of the General Session.

Among matters discussed at the Conference were production, sales, and consumption of fish meal in 1964 and the estimated production, sales, and consumption for 1965. It was concluded that a stable market for fish meal should continue, and that increases in production and consumption would remain in balance. The fish oil market was reviewed and was also felt to be firm.

The Association will give consideration during the coming year to an economic study of market trends in conjunction with FAO. Various market research and promotional matters also were considered. The Association, while considering commercial matters, in no way deals with price or control of markets, but acts in an advisory capacity.

Scientific matters discussed at the Conference included many topics on the excellent nutritional value of fish meal as a high grade animal protein, with particular reference to increasing its use in more intensive feeding of reared stock, as well as pigs and poultry, its main use at present.

There was a full exchange of information on the work being carried out to hasten the more widespread use of fish flour or fish protein concentrate for human consumption. Particular reference was made to the work being carried out by FAO in conjunction with the Peruvian fish meal industry and Government on a proposed large-scale pilot plant in Peru. Other scientific matters designed to ensure the maintenance of uniform supplies of high grade fish meal in all producing countries were also discussed at the Conference.

During 1965, the Executive Council and Scientific Committee of the Association will hold meetings in London in February or March and in Reykjavik in June or July.

Note: See Commercial Fisheries Review, October 1964 p. 45; January 1964 p. 39.

FIRST NORTH AMERICAN FISHERIES CONFERENCE OF COMMERCIAL FISHING INDUSTRIES

The First North American Fisheries Conference will be held in Washington, D.C., April 30-May 5, 1965. Participants at the Conference will be members of the commercial fishing industries of Canada, Mexico, and the United States as represented by the respective fishery trade associations of the three countries--the Fisheries Council of Canada (Canada); the Camara Nacional de la Industria Pesquera (Mexico); and the National Fisheries Institute (NFI), United States.

The occasion will commemorate the 20th anniversaries of the Fisheries Council of Canada and the National Fisheries Institute, and the 14th anniversary of the Camara Nacional de la Industria Pesquera. The Conference is also in lieu of the 20th annual conventions of the Fisheries Council and NFI, and the 14th annual convention of the Camara.

This occasion will mark the first time in the history of the fishing industry of North America that the commercial fishery trade associations of the three countries have combined for an international meeting, representing all segments of the industry.

While each organization will conduct its own business sessions and committee meetings, the General Sessions will be conducted jointly for the representatives of all three nations. Some of the matters to be discussed at the General Sessions are the resources of the North American continent and the effects of civilization on those resources; modern harvesting and processing; marketing; and the international approach. Papers will be given on those subjects by outstanding world authorities in each of those fields.

FOOD AND AGRICULTURE ORGANIZATION

WORLD FISHERY LANDINGS, 1963:

World fishery catches in 1963 of about 46 million metric tons (live-weight basis) were only about 3 percent greater than in 1962--the smallest increase in five years, according to a preliminary estimate by the Food and Agriculture Organization of the United Nations.

Most of the European countries reported higher fishery landings in 1963. In contrast to 1962, herring were plentiful both in the North Sea and in the Skagerrak and Kattegat, and in addition to those used for reduction purposes considerable quantities were frozen and salted in an effort to relieve the pressure on prices in the fresh fish market. Norway had another poor winter herring season, leading to one of the lowest outputs of kippered herring on record. Both Iceland and Norway landed considerably less Icelandic herring than in 1962. Although brisling for canning was abundant in Norway, high olive oil prices and heavy stocks caused a large part to be diverted to the fish meal industry. The cod fishery was at about the same level in 1963 as the year before in both Iceland and Norway. The United Kingdom's white fish landings in

International (Contd.):

Total Catch (Live Weight) of Fish and Shellfish in Selected Countries, 1959-1963 and 1958-1962 Average

	1/1963	1962	1961	1960	1959	Average 1958-62
	(1,000 Metric Tons)					
World total catch	46,000.0	44,850.0	41,830.0	38,230.0	35,930.0	38,660.0
1962 catch--1,000,000 tons and more:						25,030.3
Peru	6,900.0	6,961.9	5,243.1	3,531.4	2,152.4	3,763.8
Japan	6,697.6	6,863.7	6,710.5	6,192.7	5,884.1	6,231.1
China (Mainland)	2/	2/	2/	2/	5,020.0	4,828.0
U.S.S.R.	2/	3,620.0	3,250.0	3,051.0	2,756.0	3,059.6
United States	2,702.8	2,972.8	2,931.9	2,814.7	2,890.8	2,850.2
Norway	2/	1,338.0	1,509.4	1,543.0	1,575.2	1,480.0
Canada	2/	1,115.1	1,019.6	934.5	1,054.4	1,026.2
South Africa (incl. South-West Africa)	1,132.0	1,062.7	1,010.3	867.6	741.6	867.6
Spain (incl. Ceuta and Melilla)	1,086.0	1,006.0	1,014.5	898.0	855.8	923.8
1962 catch--500,000 tons and more, but less than 1,000,000 tons:						6,788.1
India	2/	973.9	961.0	1,161.4	823.2	996.8
United Kingdom	2/	944.4	902.7	923.8	988.9	951.8
Indonesia	2/	943.0	906.8	756.7	754.1	809.5
Denmark and Faeroe Islands	985.0	928.4	771.0	690.6	760.9	771.1
Iceland	773.6	832.6	710.0	592.8	640.8	671.3
France	2/	672.3	567.7	570.7	555.8	573.5
Chile	762.8	638.6	429.8	339.6	272.6	381.3
Germany, Fed. Rep.	650.3	632.7	618.9	674.0	768.0	687.3
Portugal	2/	518.0	500.7	475.1	427.8	475.4
Philippines	564.9	504.7	475.7	465.5	457.5	470.1
1962 catch--100,000 tons and more, but less than 500,000 tons:						4,860.2
Korea, Rep. of	443.8	467.6	424.5	357.2	392.1	408.9
Brazil	2/	379.4	275.1	251.0	239.1	271.3
Burma	2/	360.0	360.0	360.0	360.0	360.0
Thailand	2/	339.7	305.6	220.9	204.7	253.4
Pakistan	345.0	330.5	319.1	304.5	290.1	305.6
China (Taiwan)	350.7	327.0	312.4	259.1	246.3	274.9
Netherlands	361.0	321.9	346.1	314.7	319.6	323.2
Korea, North	2/	2/	2/	2/	2/	300.0
Sweden	339.8	290.9	267.3	254.3	268.0	263.7
Angola	2/	269.3	241.5	252.0	267.4	261.7
Viet-Nam, Rep. of	332.0	255.0	250.0	240.0	153.5	208.3
Italy	231.6	220.7	239.6	213.3	214.9	219.9
Mexico	2/	218.6	225.4	197.9	192.4	190.6
Malaysia: Malaya	2/	198.4	178.4	167.1	145.9	165.9
Poland	226.7	179.6	185.5	183.9	162.2	171.3
Morocco	178.7	162.9	164.9	154.1	144.4	157.6
Congo (Leopoldville)	2/	2/	2/	2/	153.4	145.0
Cambodia	2/	145.8	2/	2/	2/	145.8
Senegal	2/	133.4	126.9	122.1	99.8	113.6
Germany, Eastern	2/	2/	130.1	114.4	105.6	117.7
United Arab Republic	2/	118.0	92.0	88.5	85.6	92.8
Muscat and Oman	-	-	-	-	-	100.0
1962 catch--50,000 tons and more, but less than 100,000 tons:						852.4
Venezuela	97.2	94.9	83.7	84.7	83.3	85.0
Argentina	124.0	94.1	93.8	101.0	88.7	92.0
Ceylon	92.6	83.9	74.0	57.8	48.3	60.9
Turkey	2/	2/	82.3	89.4	96.7	92.4
Greece	2/	2/	2/	2/	82.0	81.0
Hong Kong	75.1	70.8	63.6	62.3	67.0	66.6
Australia	2/	66.0	61.1	61.0	58.8	60.2
Finland	2/	64.7	67.1	66.0	67.4	65.3
Uganda	69.6	64.5	61.2	62.6	55.6	59.5
Tanganyika	74.0	60.2	60.7	60.0	60.0	59.2
Belgium	2/	59.9	61.7	63.7	57.5	61.4
Aden	55.4	53.8	47.4	22.3	24.4	33.9
Colombia	47.4	51.7	47.5	29.7	21.1	35.0

(Table continued on next page.)

International (Contd.):

Total Catch (Live Weight) of Fish and Shellfish in Selected Countries, 1959-1963 and 1958-1962 Average (Contd.)						
	1/1963	1962	1961	1960	1959	Average 1958-62
	(1,000 Metric Tons)					
1962 catch--less than 50,000 tons:						441.0
Ecuador	52.2	44.5	40.4	44.3	35.9	39.2
Greenland	33.3	43.3	41.8	34.6	33.2	37.0
Ghana	2/	42.4	34.5	31.8	36.0	35.1
New Zealand	2/	41.3	43.1	44.3	41.5	41.9
Cuba	2/	35.9	31.1	31.2	28.2	29.7
Yugoslavia	34.4	30.3	37.3	30.9	29.4	31.9
Ireland	27.6	29.0	32.2	42.8	38.6	36.0
Algeria	2/	2/	2/	25.6	22.5	22.3
Hungary	21.0	21.0	19.3	14.9	14.4	16.5
Sudan	2/	18.6	17.3	16.5	16.2	17.6
Kenya	20.1	18.4	13.5	12.6	22.6	17.8
Ryukyu islands	17.4	17.8	16.0	14.4	21.4	17.2
Israel	17.5	16.4	14.9	13.8	13.2	14.2
Tunisia	2/	2/	2/	16.3	14.8	15.4
Ethiopia	2/	14.0	17.2	19.1	34.7	22.6
Malaysia: Singapore	2/	11.5	9.7	9.2	11.5	10.8
Bulgaria	7.5	9.6	8.1	8.7	6.1	7.7
St. Pierre and Miquelon	2/	8.0	13.6	10.3	9.4	9.9
Rwanda and Burundi	10.6	7.2	5.3	9.2	11.0	8.8
Uruguay	3.4	5.9	8.8	8.0	5.9	6.8
Malta and Gozo	2/	1.3	1.3	1.2	1.1	1.2
Mauritius	1.4	1.2	1.5	1.4	1.3	1.4
1962 catch--less than 50,000 tons						688.0

1/Preliminary.
2/Data not available; estimates used in computing world total catch.
Note: Countries arranged in order of 1962 catch.
Source: Food and Agriculture Organization of the United Nations.

1963 were slightly less than in 1962. Poland's fishery landings increased about 25 percent in 1963.

Fishery landings by the U.S.S.R. reached a total of 4.7 million tons in 1963. This was 200,000 tons more than the planned target of 4.5 million tons, which was already three times the 1948 landings of 1.5 million tons.

The 1963 United States fishery landings dropped about 10 percent in 1963, largely because of lower menhaden landings. The production of groundfish fillets fell by about 10 percent, and of canned fishery products by about 7 percent. The United States pack of Pacific sardines was the smallest in more than 50 years, but the packs of shrimp and oyster from the Gulf of Mexico rose sharply. In Canada, however, the total 1963 fishery landings increased by about 10 percent.

Peru's fishery landings of 6.9 million tons were estimated as only slightly less than in 1962, in spite of a lengthy vessel tie-up of anchoveta fishermen and greater difficulty in finding anchoveta. That species represented 98 percent of the Peruvian landings, which resulted in a new record output of fish meal. In Chile, the 1963 landings set a new record of 762,800 tons, but results were much below expectations because the anchoveta disappeared almost entirely from the coastal waters off north Chile for six months and a large part of the catches were small fish.

The countries with the largest landings in 1963 (Peru estimated at 6.9 million tons and Japan 6.7 million tons, excluding whales) were slightly below those for the previous year. In 1963 Japan's extended activities in distant-water trawl and tuna fisheries almost offset lower catches in some other Japanese fisheries, including the offshore fisheries and Bering Sea groundfish fisheries. Mainland China with landings roughly estimated at over 5 million tons remained the third largest fishing nation in 1963.

The 1963 landings in South Africa and South-West Africa of 1.1 million tons set a new record for the sixth year in succession. A drop in the Cape catch of shoalfish and a slight decline in trawl fish landings were offset by the very large Walvis Bay pilchard catch of 546,000 tons as compared with 395,000 tons in 1962.

Note: See Commercial Fisheries Review, December 1963 p. 53.

* * * * *

International (Contd.):

MEETING ON BUSINESS DECISIONS IN FISHERY INDUSTRIES:

Practical applications of fishery research were discussed by fishing industry executives and scientific specialists at the 5-day meeting on Business Decisions in Fishery Industries, which opened September 21, 1964, in Rome, Italy. Sponsored by the Food and Agriculture Organization (FAO) of the United Nations, the meeting was attended by about 100 persons from 35 countries. They included--in addition to the business executives--biologists, naval architects, technologists, and economists interested in fisheries problems. The scientists and technologists reported on progress in fisheries research. The economists then described the tools they have to determine whether the research results can be economically applied.

By exchanging views with scientists, the business executives can learn what the specialists can do to help solve management problems. At the same time, the business executives can indicate what are the most urgent problems on which help is required.

"We believe that improved methods of decision making will lead to improved utilization of fishery resources," the Director of the FAO Fisheries Division said. "This, in turn, will enable man to add to future food supplies and help him in his struggle against hunger."

* * * * *

INDO-PACIFIC FISHERIES COUNCIL HOLDS 11TH SESSION:

The 11th Session of the Indo-Pacific Fisheries Council (IPFC) of the Food and Agriculture Organization (FAO) was held October 16-31, 1964, at Kuala Lumpur, Malaysia.

The IPFC was established under Agreement signed at Baguio, Philippines, in February 1948. Its functions are to assemble and disseminate technical information relating to water resources of the Indo-Pacific area and to encourage and coordinate research and recommend development programs.

Note: See Commercial Fisheries Review, January 1963 p. 66.

* * * * *

FORTY-THIRD COUNCIL SESSION CONSIDERS TWO FISHERY ITEMS:

Newly Formed Ad Hoc Committee to Study World Fisheries Development: At the 43rd Session of the Food and Agriculture Organization (FAO) Council, held in Rome, October 13-16, 1964, an Ad Hoc Committee was established to study FAO's role in world fisheries development and how that role might best be reorganized and expanded. In establishing the Ad Hoc Committee, the Council gave consideration to a resolution adopted by the 12th Session of the FAO Conference (biennial) held in 1963, for proposals outlining measures which can be taken to assure that FAO's Fisheries Division is properly recognized as the leading intergovernmental body in encouraging rational harvesting of food from the oceans and inland waters, and is in a position to adequately discharge such leadership. The Conference requested the Director-General to prepare the proposals for consideration by the Council and the 13th Session of the Conference.

The Ad Hoc Committee, initially composed of Chile, France, Iran, Italy, Philippines, Senegal, the United Kingdom, and the United States, is to report and make recommendations to the 44th Session of the FAO Council to be held some time in June 1965. Membership to the Ad Hoc Committee will also be open to other Member Nations which are now, or will be in January 1965, members of the Council and who wish to participate in the Committee's work.

It was the opinion of the Council that international collaboration in fisheries might best be achieved through the establishment of a permanent committee on fisheries of selected Member Nations to deal with those matters and to advise the FAO Conference and the Council, as well as the Director-General, on the formulation, implementation, and coordination of policy and on FAO programs and activities in the fisheries field.

Tuna Resources in Atlantic Ocean: At the 43rd Session the Council also considered the report of its Working Party on the Rational Utilization of the Tuna Resources in the Atlantic Ocean and the comments on that report by Member Nations and various international councils and commissions. The Council agreed with certain conclusions of the Working Party on: (a) problems relating to all the tuna and tuna-like fish inhabiting the entire Atlantic Ocean require urgent attention; (b) that it is necessary to continue and expand programs or research in a number of fields enumerated by the Working Party; and (c) that to this and not only statistics on catches and landings are required but that a detailed and coordinated

International (Contd.):

system of data collection must be put into effect as soon as possible.

Those conclusions were supported, on the whole, by Member Nations and international organizations consulted by the Director-General. A majority of the delegations within the Council favored setting up a new organization to handle Atlantic tuna matters and agreed that a Conference of plenipotentiaries of interested nations should be called to discuss the character, functions, and operations of such an organization and if agreement were reached, to take steps to set it up. The Council came to the conclusion that the matter should be referred to the 13th Session of the Conference for a decision, but requested the Director-General in the meantime to undertake preparatory work including further consultations with Member Nations and interested international organizations so that if the 13th Session of the Conference decided that a Conference of plenipotentiaries should be called, it could meet possibly early in 1966.

Note: See Commercial Fisheries Review, April 1964 p. 43; February 1964 p. 61; January 1964 p. 38.

* * * * *

NEED FOR SANITARY REGULATIONS IN INTERNATIONAL TRAFFIC IN ANIMALS AND ANIMAL PRODUCTS:

Fishery products were included in discussions at an international meeting held in Berne, Switzerland, October 12-17, 1964, on problems associated with international traffic in animals, animal products, and related items. The meeting was convened jointly by the Food and Agriculture Organization of the United Nations (FAO), the International Office of Epizootics (OIE), and the World Health Organization (WHO).

The meeting was attended by 88 delegates from 40 countries and 12 observers from 8 international organizations. It was the consensus that more uniform and realistic sanitary regulations were urgently needed on a worldwide basis if international trade was to continue to expand to meet the world's growing food needs.

In the discussions on fish and fishery products, the discussion leader reviewed the problems connected with the hygienic inspection of fish and fishery products for human or animal consumption, as well as with international traffic in live fish and fish eggs for breeding, stocking, and ornamental purposes. His observations were based on the work and recommendations of the European Symposium sponsored by OIE held in Turin, Italy, in 1962, on diseases of fish and the sanitary inspection of fresh-water and marine fishery products. Account had also been taken of the work of the OIE Permanent Commission for the Study of Sanitary Regulations on the Importation and Exportation of Animals and Animal Products in this connection. For the purposes of international trade it was felt that standards should be established for organoleptic qualities, packaging, methods of preservation, additives, toxic or radioactive substances, and the detection of diseases transmissible to humans. A number of problems and requirements were mentioned in each case. Particular emphasis was placed on the need for certification and some of the information which certificates should contain was summarized, according to the purpose for which the fish or fishery products were to be used.

Some of the delegates at the meeting felt that there was a danger of duplication in considering those topics at the meeting in session since the Joint FAO/WHO Codex Alimentarius Commission had recently initiated work on most of them. That Commission has assigned to the Fisheries Division of FAO the task of drafting a Code of Principles and coordinating international standards for fish and fishery products. Under the chairmanship of the United States, an Expert Committee has undertaken work on the whole field of food hygiene standards within the framework of the Codex Alimentarius program. Meanwhile, a joint FAO/WHO Expert Committee was dealing with the question of food additives. It was mentioned, furthermore, that the European Inland Fisheries Advisory Commission was studying problems associated with live fish and fish eggs and had held informal discussions on fish diseases. The Organization for Economic Cooperation and Development (OECD) was also reported to be preparing draft standards for certain canned fish products in collaboration with FAO. It was, therefore, suggested that the main working paper should be passed, together with the meetings' observations, to the Joint FAO/WHO Codex Alimentarius Commission and to the European Inland Fisheries Advisory Committee with the added suggestion that the latter Committee's work should be extended to a worldwide basis.

Other delegates pointed out that the veterinary services had an important role to play in

International (Contd.):

these matters. Fish are responsible for the transmission, of several diseases to humans and animals such as Diphyllobothrium infestation, salmonellosis, hepatitis (from shellfish), and botulism. Of particular interest were the dangers of spreading salmonellosis through animal feed containing fish meal, and such new developments as fish farming in which humans, birds, and possibly animals or their excreta come into close contact with live fish, thus favoring new cycles of diseases. Inspection of fish and installations for handling and processing them, it was felt, certainly needed much greater attention, too. It was pointed out that the veterinary authorities in each country should display an increasing interest in control of diseases of fish and prevention of entry of such diseases into their respective countries.

With reference to fish meal it was generally agreed that the industry and trade should be subjected to stricter sanitary controls. Extensive investigations were under way to determine the sources of pathogenic organisms that have been encountered in fish meal. Meanwhile, it was felt that better plant sanitation, especially with respect to handling the end product, would probably be more effective in eliminating contamination than additional sterilization, which is very expensive and might endanger the product's nutritional qualities.

Recommendations made at the meeting were that the necessity for the sanitary control of international traffic in fish and fish products was recognized, and it was therefore recommended that this task be entrusted to appropriate Government services since those products may be the cause of the transmission of infectious and parasitic diseases of man and animals, including fish. The delegates also recommended that OIE and FAO continue their work on this subject and that other international organizations working in this field be invited to collaborate.

At the meeting, a review was made of the work already carried out by the sponsoring organizations, as well as by OECD and the European Common Market.

CODEX ALIMENTARIUS COMMISSION

SECOND SESSION MEETS IN GENEVA:

The Second Session of the Codex Alimentarius (Food Standards) Commission met in Geneva, September 28-October 7, 1964. The Commission is sponsored by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). The joint FAO/WHO program on food standards has as its purpose: (1) simplifying and integrating food standards work now carried on by many international organizations; (2) providing an effective mechanism for obtaining Government acceptance of those standards; and (3) their publication in the Codex Alimentarius. Primary responsibility for the work on food standards rests with FAO, while WHO is concerned with health aspects of the program.

A joint FAO/WHO Conference on Food Standards was held in Geneva, October 1-5, 1962, to establish guidelines for the Codex Alimentarius Commission. The First Session of the Commission was held in Rome, June 25-July 3, 1963.

At the 1964 Geneva meeting of the Second Session of the Codex Alimentarius Commission there were about 125 participants, including delegates from 40 member Governments, observers from 6 nonmember Governments, and representatives from 23 organizations.

Fishery products standards were discussed at the Second Session under agenda items: (1) progress reports of expert committees and (2) re-allocation of preparatory work.

Progress Reports of Expert Committees: Fish and Fish Products: The Commission received a report (Section J. Report of the Committee of Experts on International Standards for Fish and Fishery Products) prepared by the Committee of Independent Experts on Fish and Fishery products (convened by the FAO Fisheries Division). The report was approved and incorporated into the Draft Report of the Second Session of the Codex Alimentarius Commission as follows (subject to minor revisions by the Secretariat of the Commission):

Section J. Report of the Committee of Experts on International Standards for Fish and Fishery Products

> The Codex Alimentarius Commission, at its first session, requested the Director-General of FAO to convene a Committee of Independent Experts on Fish and Fishery Products to prepare for the Commission's consideration (1) recommendations for priorities among fish and fishery products to be standardized, and (2) a draft model standard.

International (Contd.):

The Committee of Experts recommended that the following products be given priority for standardization: canned herring and sardine in tomato sauce; canned herring and sardine in oils; canned tuna, bonito, and mackerel in brine or oils; canned Pacific salmon; and canned crab meat; and canned shrimp; frozen tuna and frozen herring as raw material for further processing; frozen fillets of Atlantic cod, haddock, and ocean perch (Sebastes); frozen Pacific salmon; and frozen crustaceans; cured-salted herring; and salted cod.

The Committee of Experts also drew up a skeleton code of practice for the handling of fish and fishery products as well as a suggested model standard for fishery products. The Experts made certain recommendations concerning the countries which in their opinion would be most likely to have the greatest expertise in the field of standardization of the various fish and fishery products, and requested the Director-General of FAO to approach the Governments of those countries to see whether they would be prepared to undertake this work.

The Codex Alimentarius Commission had a brief progress report on developments since the meeting of the Committee of Experts, informing the Commission (1) that a draft standard on canned bonito in oil had been received by FAO, and (2) that a number of countries had informed the Director-General that they would be prepared to elaborate draft standards on fish and fishery products.

The Codex Alimentarius Commission endorsed in general the procedure outlined in the Report of the Committee of Experts on International Standards for Fish and Fishery Products. The Commission requested that Fisheries Division of FAO should examine the draft standards which were to be submitted by "Author" countries or organizations. The (FAO) officer in charge of the Food Standards Program was instructed to invite all Members of the Commission to indicate which standards were of particular interest to them.

When in the opinion of the (FAO) Fisheries Division experts the draft standards were in a satisfactory form, they would be transmitted to those Members of the Commission which had notified their interest for detailed comments. After a reconsideration of the draft standards in the light of comments received, the officer in charge of the Food Standards Program would send them to all Members of the Commission for comment and the Commission, at its next session, will consider the action to be taken.

Re-allocation of Preparatory Work: The discussion of the future of fisheries standards work was opened by a Canadian delegate who stated that the Codex Alimentarius Commission would eventually need its own Expert Committee on Fish and Fishery Products, but it was not needed now because considerable preliminary work was in progress. The Chairman of the Commission agreed with that view. For the time being, draft standards on fishery products being prepared by various designated countries will be coordinated by the FAO Fisheries Division (in Section J of the Draft Report of the Second Session). Further action on the draft standards will be considered at the next Session of the Codex Alimentarius Commission. The Commission will not attempt to review the draft standards at that time, but will consider the appointment of an expert committee for that purpose. (United States Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, October 14, 1964.)

* * * * *

WORLDWIDE EXPERT COMMITTEE ON FOOD HYGIENE MEETS IN WASHINGTON:

In connection with work to develop international food standards, the Worldwide Expert Committee on Food Hygiene met in Washington, D. C., May 27-28, 1964. The Committee is one of the working groups of the FAO/WHO Codex Alimentarius (Food Standards) Commission. Food hygiene is included in the program because that element is essential to insure a food standard that is both effective and acceptable.

The Washington meeting of the Committee on Food Hygiene was attended by delegations

International (Contd.):

from Australia, Canada, Israel, the Netherlands, New Zealand, Sweden, Switzerland, the United Kingdom, and the United States.

The agenda adopted by the Committee included:

(1) Recommendations on the scope of food hygiene standards.

(2) Recommendations for guidelines for the development of processing and product inspection standards.

(3) Recommendations for general hygienic standards covering:

(a) disease- or toxin-producing micro-organisms

(b) bacterial indices of pollution

(c) rodent and insect indices of pollution

(d) fungi (mold).

(4) Establishment of priorities.

In handling that agenda, the Committee had before it a United Kingdom draft discussing food hygiene rules. The Committee also received prepared suggestions from the United States on food handling practices. The United States and the United Kingdom agreed to work together on a draft of hygiene standards for fish and fishery products.

The extent of the Hygiene Committee's authority was a major point of discussion during the Washington meeting. It was agreed that the Committee's work would be closely related to that of the various Codex Committees on standards for individual commodities. Whether the Hygiene Committee would work with the individual commodity committees before standards were drafted was left open for clarification by the parent Codex Commission.

Note: See Commercial Fisheries Review, Sept. 1964, p. 1.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

ACCOMPLISHMENTS AND OUTLOOK:

International Cooperation: The most notable accomplishment of the International Commission for the Northwest Atlantic Fisheries (ICNAF) since its beginning in 1951 has been the dedication to international fishery conservation and the remarkable cooperation among the scientists and administrators of the different member countries and world conservation agencies in their efforts to maintain the stocks of fish in the Northwest Atlantic at a level permitting a maximum sustained catch.

Collection, Processing, and Publication of Statistical and Biological Data: The Commission early recognized the fundamental need for complete and reliable statistics on the fisheries in the Northwest Atlantic and thus allow its scientists to make the scientific assessments which form the basis for regulating the fisheries in an effort to maintain the maximum sustained catch. Since 1951, ICNAF has concentrated effort on collecting, analyzing, and publishing data on the fish, fish landings, and fishing activity (ICNAF Sampling Yearbook and ICNAF Statistical Bulletin). Cosponsorship with the International Council for the Exploration of the Sea (ICES) and the Food and Agriculture Organization (FAO) of the Expert Meeting on Fishery Statistics in the North Atlantic area in 1959 and of the Continuing Working Party on Fishery Statistics in the North Atlantic area has resulted in standardized statistical requirements and procedures for the whole of the North Atlantic region.

Development of Research Programs, New Ideas and Techniques: The Commission, proceeding on the basis of making sure of the scientific data before embarking on ambitious regulatory measures, drew up an international fisheries research program and stimulated the development of new ideas and techniques for the solution of international and national fisheries-management problems by organizing international scientific symposia on:

(1) "Biological fisheries survey problems and techniques for their solution," at Biarritz, France, in 1956;

(2) "Fishing effort, effects of fishing and selectivity of fishing gear," at Lisbon, Portugal, with ICES and FAO in 1957;

(3) "Redfish (Sebastes) in the North Atlantic," at Copenhagen, Denmark, with ICES, in 1959;

International (Contd.):

(4) "Techniques for fish marking and methods of analyses of recovery data," at Wood Hole, Mass., in 1961;

(5) "Influence of the environment on the distribution and abundance of the major fish stocks of the ICNAF area," at FAO, Rome, in 1964.

All symposia are published in the ICNAF Special Publication series for worldwide distribution.

Regulation by Mesh Size as a Conservation Measure: Based on the success of an experimental $4\frac{1}{2}$-inch mesh size regulation enforced in 1952 in Subarea 5 (Georges Bank) which allowed the small haddock in the declining trawl fishery for haddock to escape in the sizes and quantities recommended by Commission scientists, regulation by mesh size was applied as a conservation measure to other important commercial species in the other subareas. ICNAF mesh-size regulations are now enforced for cod and haddock in Subareas 3 (4-inch), 4 and 5 ($4\frac{1}{2}$-inch), and are proposed for all groundfish species in Subareas 1, 2, and 3, excluding redfish (ocean perch) in Divisions 3NOP ($4\frac{1}{2}$-inch), and for cod, haddock, and flounder in Subarea 4 ($4\frac{1}{2}$-inch).

Assessment of Effect of Mesh Size: Commission scientists pioneered in the development of methods for the assessment of the benefit of saving small fish by regulating mesh size of the nets. In 1962, they reported on the effects of fishing on the stocks of the major commercial species and on assessments of the effect on catches, both immediate and long-term, of changes in the selectivity of gear, in particular, of changes in the mesh-size of trawls. These assessments of the benefit of mesh regulations are reviewed annually and are the basis for recommendations by the Commission for changes in mesh-size regulation to maintain the fish stocks at a level permitting a maximum continuous catch.

Assessment of Effect of Fishing: In 1964, the Commission, from an assessment of the effect of the increasing fishing activity has found that (a) the fishing intensity with which many of the major stocks of cod and haddock are now being fished is near that at which they can provide their greatest sustained catches, and (b) that mesh-size regulations cannot, in themselves, offset the consequences of the continuing build-up in fishing pressure. The Commission, concerned at the implications of those findings, has asked its scientists to continue studies of effects of fishing and to review possible additional conservation measures which might be used to ensure greatest continuous yield from the fish stocks in the Northwest Atlantic.

Assessment of Effect of Environment on Fish: The Commission developed and adopted an environmental program to assess the influence of natural causes on the abundance and distribution of fish stocks and on the success of fishing operations. From April to June 1963, a pioneering survey (NORWESTLANT I-III) studied the drift of cod eggs and larvae and redfish (ocean perch) larvae in relation to their environment in the northern part of the ICNAF area and in the Irminger Sea. The survey involved the coordinated efforts of 8 countries using 11 research vessels. Results are being prepared for publication in the ICNAF Special Publication series. The Commission also completed an international scientific symposium on the environment in relation to the major fish stocks in the North Atlantic at FAO, Rome, in early 1964. Results provided ideas for environmental studies to distinguish between the effects of the environment and effects of fishing on changes in the fish stocks.

Exemptions in Nonregulated Fisheries: In addition to using regulation by mesh size as a conservation measure, the Commission has adopted exemption measures for the protection of the regulated species (cod and haddock) taken in areas where there are substantial fisheries using small-mesh nets for nonregulated species.

Adoption of Principle of International Enforcement: The Commission unanimously agreed to recommend to contracting governments that a system of international enforcement of Commission regulations be set up to eliminate the variability of standards possible under a system of national enforcement.

Acceptance of Responsibility for Seal Conservation: As a result of unanimous agreement in the Commission, the study and recommendation of conservation measures in the declining international fishery for harp and hood seals in the Northwest Atlantic will shortly become an ICNAF responsibility.

International (Contd.):

Outlook for Immediate Future: The outlook for the future is based on the Commission's concern for the rapidly increasing fishing activity in the Convention Area by the 13 member countries and at least 2 nonmember countries on present and new stocks and species of fish. Commission scientists have warned of the consequences and expansion must now give way to rational and controlled exploitation. Regulation of mesh size, although a good conservation measure, has been shown as not completely adequate in controlling exploitation and has raised serious enforcement and practical fishing problems. Additional conservation measures will be sought and problems of early implementation and enforcement will be considered in the immediate future. The Commission will continue to cooperate and exchange ideas with ICES, NEAFC, and FAO with the aim of establishing common benefits for countries fishing in the whole of the North Atlantic. Commission scientists will continue to collect data on the fisheries and to develop new ideas and techniques which will allow them to advise the Commissioners, impartially and objectively, on the effects of fishing and of proposed regulative measures on the stocks and catches. The Commission will continue to look forward to international cooperation and goodwill to the end that all member countries may benefit from the fisheries in the Northwest Atlantic. (ICNAF Newsletter No. 46, Dartmouth, N.S.)

Note: See Commercial Fisheries Review, Dec. 1964 p. Aug. 1964 p. 49; June 1964 p. 35.

INTERNATIONAL CONVENTION FOR THE NORTHWEST ATLANTIC FISHERIES

PROTOCOL AMENDMENT CONCERNING HARP AND HOOD SEALS RATIFIED BY DENMARK AND FRANCE:

Ratifications of a Protocol to the International Convention for the Northwest Atlantic Fisheries of February 8, 1949, relating to harp and hood seals, were deposited by France (July 21, 1964) and Denmark (July 27, 1964). The Protocol, done at Washington, D. C., on July 15, 1963, is intended to bring those species within the responsibility of the Northwest Atlantic Fisheries Commission. The Protocol is not yet in force. (The Department of State Bulletin, August 17, 1964.)

Note: See Commercial Fisheries Review, July 1964 p. 42; March 1964 p. 45.

NORTH PACIFIC FISHERIES CONVENTION

RENEGOTIATION TALKS IN OTTAWA END:

The third meeting of the parties to the International Convention for the High Seas Fisheries of the North Pacific Ocean which began on September 9, 1964, came to a close October 1, 1964, in Ottawa, Canada.

The present Convention and the modifications of this Convention (which were under discussion during the three meetings) have the primary objective of promoting cooperation among the three parties (Canada, Japan, and the United States) in developing and applying effective conservation measures and procedures for North Pacific stocks of fish of common interest.

The earlier meetings, which were held in Washington, D. C., in June 1963 and in Tokyo in September 1963, had provided an opportunity for the delegations from Canada, Japan, and the United States to present and clarify their views concerning revision of the Convention, and the third meeting concentrated on consideration of the principles and details to be included in a revised Convention.

During the course of the meeting the Japanese delegation submitted a draft convention including accompanying protocols which incorporated various modifications of the draft convention discussed at the Tokyo meeting. The new draft took into consideration certain important suggestions made by each delegation at the earlier meetings.

The delegations examined and discussed the new draft convention and protocols and presented constructive modifications for further consideration.

It was generally agreed that the form and content of the articles of the convention under consideration could be made acceptable to the three delegations by means of revisions which were mainly of a drafting nature. However, because of certain problems which could not be resolved at this time it was not possible to reach full agreement on the salmon and halibut protocols which form an integral part of the Convention.

Throughout the meeting the delegations exchanged views in a frank manner and studied various concrete proposals in efforts to re-

International (Contd.):

solve the remaining differences, particularly with regard to the contents of the protocols. As the result of these constructive and conciliatory efforts considerable progress was made, but it was finally decided that complete agreement could not be reached at this time. The delegations therefore concluded that the meeting should adjourn and recommended to the Governments that a fourth meeting be convened at some later date for the purpose of reaching final agreement. In this connection the United States delegation expressed the hope of its Government that the next meeting might be held in the United States at a time and place to be determined by the three Governments.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

52ND STATUTORY MEETING HELD IN COPENHAGEN:

The 52nd Statutory Meeting of the International Council for the Exploration of the Sea (ICES) was held in Copenhagen, Denmark, September 27-October 7, 1964. Some 160 delegates and experts from the 16 European Member Countries were in attendance, and others as observers from other countries and international organizations. About 20 committees and working groups considered as many as 150 scientific papers and presented their reports to the Bureau of the Council.

The United States delegation included representatives from the U. S. Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife. Other representatives were from the U. S. National Oceanographic Data Center, the U. S. Naval Oceanographic Office, and the Woods Hole Oceanographic Institution.

The 52nd meeting followed a previous meeting (September 7-12, 1964) convened by the Danish Government to draw up a new constitution with a view to facilitating the implementation of the Council's program. A new Convention for ICES was considered and agreed upon at the previous meeting. The new Convention states, "The Council shall be concerned with the Atlantic Ocean and its adjacent seas and primarily concerned with the North Atlantic." Formerly, ICES confined itself largely to the eastern part of the North Atlantic, primarily off Europe and Iceland.

Among the more important conclusions reached at the Council meeting were:

(1) In view of the extensive exploitation of tuna, sardine, and many other species in the tropical Atlantic, it was decided to develop a research plan and to organize collection of fisheries statistics from the area. Details of the plan, to be known as the "Equatorial Project," are to be drawn up by a Symposium expected to be convened in 1966.

(2) In connection with a request from the Director-General of the Food and Agriculture Organization (FAO) for comments by the Council on the FAO Working Party for the Rational Utilization of the Tuna Resources of the Atlantic Ocean, the Council extended its cooperation to FAO, and to any new organization which might be set up by FAO or by any other international agency for the purpose of organizing and carrying out investigations in the area, aimed at rational exploitation of fish stocks.

(3) Cooperation with the International Commission for the Northwest Atlantic Fisheries (ICNAF) was to be extended and intensified. Joint meetings of scientific experts from both sides of the Atlantic were advocated, preferably independent of the annual meetings of both organizations.

(4) A "Symposium on Arctic Pelagic Fishes" was scheduled to be held in Copenhagen in October 1966. Although most of the species involved are not of great value to mankind, at least not as a food, they are extremely important in the marine food chain and through their effect on the distribution and availability of commercially important fish, such as cod.

(5) During the last three years, ICES Plankton Committee has been working out plans for instituting a review on present plankton research methods, with a view to standardizing them and making the results comparable. Since this work is urgent and of worldwide concern, the Council decided to start on it immediately. There will be four Working Groups to deal with specified items. The United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Special Committee on Oceanic Research (SCOR) are ready to cooperate and to share expenses.

(6) ICES acts as scientific adviser to the North-East Atlantic Fisheries Commission (NEAFC) through a special Liaison Committee. To provide scientific evidence for the benefit

International (Contd.):

of NEAFC, working groups were set up to deal with problems concerning, among others, herring in all European waters, cod and other bottom fish, and fishing gear.

In his opening address, the President of ICES drew attention to the misunderstandings and conflicts which may arise from routine scientific samplings and other probings of the seabed and subsoil and of the bottom fauna by means of bottom grabs, dredges, corers, and similar devices. Such actions for purely scientific purposes could be interpreted as exploitation of the Continental Shelf. Wishing to avoid misunderstandings and anxious to insure that research vessels may continue to operate as in the past, the Council is seeking cooperation to insure that the work of research vessels of Member Countries will not be impeded. ICES indicated its readiness, if necessary, to assist in compiling a register of vessels regularly engaged in scientific investigations on behalf of member countries.

A highlight of the Statutory Meeting was a 2-day symposium on the salinity-density-electrical conductivity-relationships of sea water. A new set of tables is to be drawn up by the National Institute of Oceanography in Great Britain and published by UNESCO on behalf of ICES, in order to facilitate international comparison of the readings of electrical salinometers.

The 53rd Annual Meeting of ICES will be held in Rome, Italy, October 4-13, 1965. (Assistant Regional Fisheries Attache for Europe, United States Embassy, October 28, 1964.)

Note: See Commercial Fisheries Review, November 1964 p. 68.

ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

FISHERY TECHNOLOGISTS MEETING HELD:

A meeting of fishery technologists, sponsored by the Organization for Economic Cooperation and Development (OECD), was held at Op Gouden Wieken, Scheveningen (The Hague), in the Netherlands, September 14-17, 1964.

About 200 technologists from various govment agencies, the fishing industry, and research institutions attended the meeting. They were from 19 countries, the Food and Agriculture Organization (FAO), and the European Economic Community (EEC). The OECD Fisheries Committee sponsored the meeting as part of its 1964 work program because the agenda dealt with a number of fishery subjects of direct interest to current or proposed projects of the Committee. Developments in fishery technology have been numerous but fishery technologists had not had an opportunity to attend a meeting of this type since 1956.

The countries and organizations represented at the meeting were: Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Netherlands, Norway, Portugal , Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, FAO, and the EEC. United States representatives were from the Bureau of Commercial Fisheries, National Fisheries Institute, and also the U. S. Fisheries Attache for Europe at Copenhagen, Denmark.

Discussions at the meeting centered on the following major topics which were outlined in a series of 20 background papers:

1. Storage of fish in chilled sea water on fishing vessels (biochemical and engineering aspects).

2. Prepackaging of fresh, frozen, smoked, and other products for retail sale.

3. Handling of wet fish aboard vessels (except in chilled sea water).

4. Handling of wet fish on shore.

5. Problems in freezing, cold storage, and thawing.

Participants at the meeting included many technologists from private industry which led to a useful exchange of views and opinions between them and technologists from government agencies and research institutions. All participants welcomed the opportunity to discuss recent technological developments and hoped that similar meetings could be held more often than in the past.

One of the more significant developments at the meeting was the report by a Portuguese trawler owner that he was successfully supercooling his fish catch to -1° to -3° C. (about 27° to 30° F.) and bringing in the partially frozen fish after 25 to 30 days in a condition which commanded premium prices. The view was held that although contrary to theory, the

International (Contd.):

procedure worked in practice, at least for warm-water fish caught off Africa.

The FAO representative at the meeting convened members of his Experts Committee separately to discuss future technology meetings and related matters. His group suggested that FAO hold meetings each two years, alternating between a technological meeting with substantial participation and a scientific meeting of the symposium type with limited attendance. An FAO technological meeting was suggested for 1966 to consider only two topics--frozen fish and irradiated fish. The latter would include discussions of packaging materials for that product.

A complete report by OECD on the Fishery Technologists Meeting will be issued early in 1965. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, September 30, 1964.)

Note: See Commercial Fisheries Review, July 1964 p. 43.

SALMON

ATLANTIC SALMON FISHERY:

There have been reports for some years of an Atlantic salmon commercial fishery established in the waters off the Greenland coast. The annual salmon catch during 1960-1962 was about 500 metric tons and was caught in gill nets by Danish fishermen. Return of tags indicate that the salmon originate from both the Atlantic coast and from Europe. From the North American side of the Atlantic, most of the tagged fish came from Canada's Maritime rivers, and one was a post-kelt tagged at Cherryfield, Me., which was caught north of the Arctic Circle.

As Greenland's rivers lack spawning facilities, most of the Danish commercial fishery comes from stocks outside the Greenland area. For that reason, Canada's Department of Fisheries and Maine's Atlantic Sea Run Salmon Commission are interested. It is reported that the International Commission for the Northwest Atlantic Fisheries has consented to obtain accurate records on the number of salmon taken in the Danish offshore fishery.

A similar situation is said to prevail in Canada's Newfoundland commercial fishery with much of the stock originating from the rivers of Quebec and the Maritimes, and also the Baltic salmon fished by U.S.S.R., Poland, Finland, and Denmark from stock provided in great part by Sweden's fish hatcheries. (The Atlantic Salmon Journal, June 1964, No. 2.)

EUROPEAN FREE TRADE ASSOCIATION

INDUSTRIAL TARIFFS SCHEDULED FOR FURTHER REDUCTION:

By the end of 1966 the European Free Trade Association (EFTA) will have become a single market of 100 million people almost completely free of tariff and other restrictions in industrial goods traded between EFTA member countries. Tariffs are now at 40 percent of their 1960 level. The remaining tariffs will be eliminated as follows: reductions of 10 percent will take place on December 31, 1964, and December 31, 1965, and a final reduction of 20 percent will be made at the end of 1966.

Note: See Commercial Fisheries Review, April 1964 p. 40; March 1964 p. 35.

Australia

ABALONE INDUSTRY BEING DEVELOPED:

A number of different species of abalone are found around the entire coast of mainland Australia and Tasmania. In some Australian states the abalone is also called "mutton fish." The Technical Research Section of the Fisheries Branch, Australian Department of Primary Industry, has collected considerable information on abalone designed to assist Australian fishermen engaged in that fishery. The abalone fishery in Australia is relatively new and because of the good demand for it in some countries, particularly Asia, the Australian Government conducted research on harvesting, processing, and distribution of the new resource.

The larger species of abalone have the greatest commercial value. Those include the red abalone (Notohaliotis ruber) which inhabit the New South Wales, eastern Victorian, and Tasmanian coasts, and the white abalone (Schismotis laevigata) found on the southern Western Australian, South Australian, Victorian, and Tasmainian coasts. Red abalone grow to a diameter of 6 to 7 inches and the white species up to 6 inches.

An even larger species of abalone (Haliotis laevigata), which grows 9 to 10 inches in diameter, is found on the southwest corner of Western Australia from Albany to Hamelin Bay.

Australia (Contd.):

Smaller abalone species include Haliotis asinina which are about 3- to 4-inches in diameter and are found in Northern Australia, northwest Western Australia, Queensland, and the Pacific Islands, Neohaliotis scalaris (4 inches), common in Western and South Australia, and Emma's abalone (Marinauris emmae), which grows to about 3 inches in diameter and is found in Port Phillip Bay and Western Port bays of Victoria.

Abalone, a mollusk of the gastropod family Haliotidae, cling to reefs, rock, and coral, between low tide level and a depth of about 100 feet, and are gathered by divers. The coast of Tasmania and most of the southern and southeastern coasts of Australia are considered most suitable for the commercial exploitation of abalone. However, nothing is known of the density of abalone populations which may be found in those areas.

Diving Methods for Taking Abalone: In Australia, SCUBA gear and foam rubber suits are used to collect abalone and teams work from anchored boats as opposed to "free" boats favored by so-called "hard hat" divers Australian crews usually consist of two persons--a diver and a diver-tender boat han--dler--although sometimes a number of divers operate from one tender. Other divers prefer to work alone from an anchored skiff, and even dispense with a surface crew member.

On the east coast of Tasmania, abalone is collected by divers working from fast motor launches. They often work free with a snorkle or SCUBA equipment. A diver can work 6 or 7 hours a day with a snorkle but diving with SCUBA equipment is more exhausting and $3\frac{1}{2}$ hours is the usual limit for diving time. Introduction of new diving equipment is being considered. This consists of a face mask, and a demand valve connected by an air line to a compressor on the surface.

Abalone are pried from rocks with a short, flat iron bar and collected in baskets for dispatch to the surface. Since abalone are highly perishable, they must be delivered to the processor without delay. In colder climates they are fished only during the summer and the operations are very dependent on weather conditions.

On the south coast of New South Wales the price for abalone has been A£65-85 (about US$146 to $190) a ton, depending on size, and divers have landed between half a ton and a ton a day. Prices vary directly with size, small abalone being the lowest priced. Abalone taken off New South Wales weigh about 12 ounces each and average about 3,000 to the ton. But observations by divers there suggest that while there are areas where there are good concentrations of abalone, they are not extensive and would not stand intensive fishing.

Abalone grounds off the States of Tasmania, Victoria, and South Australia appear to provide the best prospects. Processing plants have been set up on the south coast of New South Wales, on the east coast of Tasmania, and on the Mornington Peninsula in Victoria.

Frozen Abalone for Export: Most Australian abalone is frozen whole for export, although some canning is being undertaken, and that section of the abalone industry is the one which is expected to expand further.

At Bicheno, headquarters for the abalone industry in Tasmania, abalone are air-dried for export to Hong Kong and other Asian markets. It takes as long as eight weeks for the abalone to dry, after it is salted and threaded on lines and hung up in a room. The dry abalone are weighed in catties ($1\frac{1}{3}$ pounds) which is the weight used in Hong Kong. It may also be sold in bulk by the picul (133 pounds), the Hong Kong equivalent of a hundredweight. The abalone is packed by color classification and size, gradings being 7-10, 10-12, 12-15, 15-20 pieces per cattie.

Abalone taken on the east coast of Tasmania can be as large as 9 inches in diameter but the average is 5 inches, which is the minimum size of shell allowed to be taken in that State.

There were said to be no forseeable difficulties in freezing and storing abalone for some months. The product should be shelled and the usual precautions taken to prevent desiccation during frozen storage such as glazing and/or wrapping in water-vaporproof film. Storage should be at as low a temperature as possible, preferably lower than -5° F.

Shelled abalone can be stored satisfactorily in the frozen state at about -5° F. for subsequent canning. If the abalone are to be canned immediately, they need not be frozen, but the shelled product should be de-salted or immersed in brine.

Canning Process: The Australian method to can abalone is to place shelled meats layer-

Australia (Contd.):

ed with salt in a suitable container. Use 7 pounds of pure dairy salt to every 100 pounds of meat. Leave a least for 24 hours. Alternatively the meats may be immersed in a salt brine made by adding one pound of salt to $1\frac{1}{2}$ gallons of water and kept immersed for the same period. Scrub the meats with a stiff brush to remove black pigmented skin. Trim base of foot and remove edge of mantle and mouth. De-salt in lukewarm water at 100° F. for two hours.

Pack the prepared meats in suitable size cans and top up with water. Enough salt usually remains in the meat to produce the required salt concentration. Heat exhaust canned product or close under vacuum. Cook in pressure retort according to can size.

To produce abalone steaks the shell is removed and the viscera and dark tough outside fascia are trimmed around the foot muscle. The muscle weighs about one-third of the original live weight of the mollusk. After being trimmed, the meat is washed and sliced across the grain into steaks from $\frac{3}{8}$ to $\frac{1}{2}$-inch thick. The steaks are the consistency of a rubber truck tire at this stage and must be tenderized. This is done by pounding them with heavy mallets till they feel velvety. The steaks are then graded according to size and color and packed in 5- and 10-pound cartons and frozen. White abalone meat is considered to be the most desirable and large white steaks bring the best prices.

Drying Process: The abalone are soaked in brine after being removed from the shell. After washing, the salted abalone are cooked for about half an hour in water just below boiling point. They are then spread in shallow trays on drying frames to dry in the sun. Four or five days later the abalone are cooked again for an hour and then smoked for a day with charcoal smoke. They are rinsed in boiling water and finally dried for about six weeks. After rinsing in warm water the dried abalone are ready to prepare for the table.

The drying process causes a loss of weight of about 90 percent. The dried abalone are hard and tough but can be sliced with a sharp knife. The Chinese stew the dried product after soaking it or grind it into a powder and use the pulverized abalone for soup. However, this process probably would be too long and costly, for the Australian abalone industry to compete successfully in foreign markets.

About one-half dozen Australian firms are reported to be handling and processing abalone. (Australian Fisheries Newsletter, June 1964.)

Canada

MARINE OIL INDUSTRY TRENDS, JANUARY-JULY 1964:

Production: Canadian output of marine oils during the first 7 months of 1964 totaled 2,445,000 imperial gallons, a decline of 8.1 percent from that in the same period of 1963. Pacific herring oil production declined in 1964 as did Atlantic groundfish and seal oil production. The decline was partly offset by an increase in Atlantic herring oil production.

Canadian Marine Oil Production, January-July 1964 with Comparisons

Area	January-July		Year		
	1964	1963	1963	1962	1961
	. . . . . (1,000 Imperial Gallons)				
Atlantic . . .	714	687	1,235	1,160	1,313
Pacific . . .	1,731	1,974	5,713	4,408	1,718
Total . .	2,445	2,661	6,948	5,568	3,031

Source: Monthly Review of Canadian Fisheries Statistics, July 1964.

Fig. 1 - Off the British Columbia coast, a Canadian purse-seiner is drawing or pursing the net tighter around a good catch of herring. Canada's west coast herring is principally for making fish meal and oil.

Foreign Trade: Canada, usually a net importer of marine oils, reversed the pattern in the first part of 1964, Canadian marine oil im-

Canada (Contd.):

Fig. 2 - A power winch operates the brailer or large scoop used to transfer the herring from the net to the vessel's fish hold.

ports during January-April 1964 were only 290,000 pounds as compared with 4.0 million pounds in the first 4 months of 1963. Exports, on the other hand, rose from 8.7 million pounds during January-July 1963 to 16.2 million pounds during the same months of 1964. The sharp increase resulted from increased herring oil exports. Those totaled 10.2 million pounds in January-July 1964 (6.4 million pounds to the United Kingdom and 3.8 million pounds to the United States). In the same period of 1963, herring oil exports totaled only 34,000 pounds, all of which went to the United States. Cod-liver oil exports during January-July 1964 totaled 4.6 million pounds of which 4.3 million pounds went to the United States. Last year, during the same period, 8.1 million pounds of cod-liver oil were exported, including 7.4 million pounds to the United States. (United States Embassy, Ottawa, October 9, 1964.)

* * * * *

RESEARCH HIGHLIGHTS AND RESULTS DISCUSSED AT 19TH ANNUAL MEETING:

The research work conducted by scientists of Canada's Fisheries Research Board consists of about 70 percent biology, 20 percent technological research, and about 10 percent oceanography. Canadian scientists on the Fisheries Research Board are active participants in the work of most of the international fisheries commissions on which Canada has membership.

At the 19th annual meeting of the Fisheries Council of Canada held this past April at Charlottetown, Prince Edward Island, the Assistant Chairman of the Fisheries Research Board of Canada gave a report on highlights of recent research results. The text of his presentation titled "Research Ready for Application," follows:

"Oceanography: Until fairly recently, the major responsibility for Canadian research in oceanography was assumed by the Fisheries Research Board. During the past decade a much larger and still rapidly-growing Canadian program in oceanography has developed which is shared by various agencies and coordinated by a Canadian Committee on Oceanography. The Marine Sciences Branch of the Department of Mines and Technical Surveys is taking on the lion's share of oceanographic work in the physical sciences and, as a result, the Board is gradually diverting some of its oceanographic energy from survey and monitoring responsibilities to biological oceanography. Indications of the benefits accruing to the fishing industry from this overall expansion are already apparent:

"1. The first of a series of fishermen's charts of Atlantic fishing grounds will be released by June of this year.

"2. An Oceanographic Information Service, similar in some respects to the Meteorological Service, is developing on both coasts. You can now receive weekly charts of weather, sea state and swell, ice conditions, surface temperatures, vertical temperature profiles, and forecasts of changes in the marine climate. With a Seafax recorder you can obtain most of this information on a daily basis at sea. This Information Service is already used by whale, seal, and tuna fishermen and it is expected that industry will soon be well aware of the increased efficiency which is possible by making much more extensive use of this Service. Forecasting the timing and direction of approach of British Columbia salmon runs is becoming more imminent with our increasing understanding of Pacific oceanography.

"3. Oceanographers are also providing information on long-term temperature changes in our marine climate which, in turn, have important effects on our fisheries. The warming trend of the late 40's and early 50's in the West Atlantic resulted in increased catches of southern species. The current trend to a cooler Atlantic environment is associated with relatively more cold-water fish in landings. These environmental effects on a few of our largest fisheries were recently reviewed by scientists of the International Commission for the Northwest Atlantic Fisheries (ICNAF), and the accumulated information will be published by that Commission. Fluctuations in marine climate with associated effects on resources have also been observed in the eastern Pacific.

"Biological Research: In the biological field, you are particularly interested in the status of resources. You are concerned with forecasts of the abundance of the main stocks now cropped by industry, and you need information on opportunities for expansion. For convenience, I will summarize the situation, as we see it, moving from east to west across Canada:

"Off Labrador, the Canadian cod fishery has declined during the first half of this century from big

Canada (Contd.):

business to a relatively low level. However, the recent development of a large international trawler fishery off Labrador has been accompanied by a growing Canadian interest in the potential for renewed Canadian exploitation of these resources. A year ago this month the A. T. Cameron had 100 European trawlers within a ten-mile radar range fishing cod. This was some 200 miles offshore on Hamilton Inlet Bank, where the cod were at depths of 120 to 180 fathoms. By autumn, cod were still abundant, but in shoaler water. There are several good year-classes of young cod in the Labrador area, and it is expected that large commercial catches will be taken there during the next few years. Large catches of redfish, grey sole and shrimp are also available in deep water off Labrador.

"The new gill-net fishery for cod in Newfoundland is still very profitable, but rather insecure since it is based on stocks of large, old fish. The general rule for fisheries is that intensive exploitation reduces fish sizes and availability. Average catch per net at Trepassey, one of the key gill-net areas, decreased from 770 pounds in 1961 to 660 pounds in 1962 and 510 pounds in 1963. The cod resource along the east coast of Newfoundland is intensively fished by Canada and several European countries. Large Canadian trawlers might be well advised to exploit deep-water concentrations of Newfoundland cod during late winter and spring months, but this would probably not produce any large increase in total landings of inshore and offshore Newfoundland cod.

"The appearance of occasional big year-classes of haddock in the Newfoundland area has resulted in a valuable but very unstable haddock fishery. The last large year-classes of 1955 and 1956 were cropped quickly by the international trawler fleet. Haddock catches have been reduced to a very low level, and surveys give no indication of good recruitment to revive this fishery during the next few years.

"Large stocks of small ocean perch (redfish) and plaice flounders are available as alternate resources for trawlers. Herring and capelin might also be taken in large quantities if marketing problems can be resolved.

"It is worth noting here that we are very much interested in experimental introductions of new species. This fall, we will be looking for returns from the 1962 transplant of $2\frac{1}{2}$ million pink salmon eggs to southeastern Newfoundland. An appreciably larger transplant is planned for this autumn.

"The fisheries of Nova Scotia and southern New Brunswick should continue to expand. Year-round access to a large variety of fast-growing species offers assurance of healthy fisheries. In Nova Scotia, industry has been shifting attention from the northeast to the southwest for haddock, scallops, swordfish, and tuna, and this trend is expected to continue. Good recruitment of year-classes will maintain the haddock fishery; scallop landings are levelling off but they should continue to be high in 1964 if prices are good enough to sustain high effort; increased landings of porbeagle sharks, tunas and skipjacks are expected. Canadian fishermen will eventually follow the lead of the United States and U.S.S.R. and use small-mesh otter trawls to catch small species such as herring, whiting, and 'argentines'.

"The resources of the Gulf of St. Lawrence are being intensively fished by fishermen from 5 Atlantic Provinces and about 5 other countries. Our studies of cod in the southwestern Gulf of St. Lawrence show that this stock is fished as intensively as any known cod stock. The average fish size has been greatly reduced and the catch-per-unit of effort has decreased. We believe that increased effort will not appreciably increase the total catch. We expect that dragger operations will be maintained by fishing for a longer season outside the Gulf and by shifting good-weather effort to the northeastern half of the Gulf where cod, a few new year-classes of ocean perch, and a deep-water concentration of small shrimps are available to industry.

"Lobsters are very intensively fished. In the southern Gulf, the fishery now takes as much as 90 percent of the marketable stock, and this heavy fishing has reduced the proportion of large lobsters to only 3 percent in Northumberland Strait. No major increase in landings is possible, but profits could be increased by greatly reducing fishing effort. Costs of handling and shipping can also be reduced, and a bulletin for your guidance on this subject is in press.

"Oyster rehabilitation is proceeding satisfactorily, except at Shippegan, and current development of oyster hatchery operations should lead to increased production.

"Catches of Atlantic grilse salmon improved in 1963, but the hazards of forest spraying, mine pollution, and commercial exploitation as far away as Greenland do not offer much hope for further increases in the Canadian catch of Gulf salmon.

"In the Great Lakes area we have been carrying out the Canadian share of an international experiment to assess the possibilities of controlling sea lampreys, and thereby build up lake trout production to former levels. After eight years the lamprey population of Lake Superior has been reduced by about 80 percent through use of chemicals, and the trout are showing some signs of recovery. The big question yet to be examined is the relation of high control costs to benefits.

"In the Prairies we have followed up on our experiment in biological control of the Triaenophorus cysts which restrict exports of whitefish and lake herring. In a small lake, the life cycle was broken by intensively fishing pike down to sizes which were too small to eat infected fish. The pike have completely recovered and the cysts have not reappeared. A pilot-plant experiment on a commercial lake now appears to be in order.

"In the Prairies and Northwest Territories we think that a much greater production of whitefish and lake trout can be taken. We hope to carry out an experiment with the provinces to test this hypothesis. Initially it is proposed that quotas on a few commercial whitefish lakes will be deliberately changed to see what happens. Industry cooperation will be needed if this commercial experiment is to be effective.

"The Arctic offers a very limited production of arctic char, lake trout, whitefish, lake herring, western sea herring, and a few species of marine mammals. Native fishermen, of course, have priority in the exploitation of those species.

Canada (Contd.):

"In British Columbia immediate prospects for high landings of presently exploited species are not very bright, but the long-term picture is encouraging.

"The 1964 runs of salmon to the Fraser and Skeena Rivers are expected to offer little surplus over numbers required for spawning escapement. However, if management and increased fish-culture operations are carried out, the long-term prospects for increased salmon production are good.

"The halibut resource is fully used. Quotas for 1964 have been reduced in Area 2, and no long-term increase in landings can be expected.

"The cod fishery depends on 1 or 2 age groups and as a result it is rather unstable. Catches are expected to continue to improve in 1964. Petrale sole landings should also be higher this year. Southern groundfish resources are almost fully used, but ocean perch, other rockfishes, and shrimp offer possibilities for increased trawler landings from the Gulf of Alaska. Fisheries for tuna, saury and pomfret could be developed.

"The large herring fishery should become more valuable if herring can be used more for human food.

"Inshore fishing for invertebrates will gradually increase. Greater crops of butter clams, razor clams, small abalone, and oysters can be taken. Oyster production will be high again in 1964 as a result of the tremendous natural seeding in 1958; but a decline is expected in a year or two, which will only be remedied by returning to farming procedures.

"In summary, although many of our fisheries resources are fully used, we still have many opportunities for wiser use of the stocks now fished and for development of new fisheries to meet the ever-increasing demand for higher landings. Production from North American waters is still low compared with the northwest Pacific or the Northeast Atlantic, where large human populations make heavy demands on marine production for food. You can be optimistic about the availability of resources for continued expansion of Canadian fisheries.

"Our research programs are partly designed to provide increasingly useful predictions to meet your requirements for resource information.

"Technological Research: ...Our most important problem in marketing of fishery products is quality-control. Long-term programs have defined the conditions necessary to minimize physical and chemical deterioration of fish after capture. The importance of rapid cooling, proper handling, low-temperature storage and shipping conditions, and high sanitary standards are well know and application of this knowledge is gradually being put into effect.

"We are now devoting a considerable amount of attention to effects of conditions and activities of fish prior to capture on the quality of fisheries products. Fish processors have long recognized that sea-fresh fish are not necessarily top quality fish. Our work in this field is defining and forecasting variations in quality of fish at capture, and exploring means of avoiding or treating low quality fish.

"Spent fish are soft, and slow recovery from this condition results in jelly fillets and summer 'drip' as high as 15 percent. Since fish are commonly concentrated at spawning time, landings are sometimes highest when sea-fresh quality is not at its best.

A Canadian mobile laboratory (mounted on a truck-trailer assembly) used for technological studies. Shows central work area with various items of equipment.

"Diet of fish has important effects on their odors and flavors. The 'Blackberry' condition found in inshore Labrador cod is an important case in point. The pteropod in cod food produces a very objectionable dimethyl sulphide odor in the affected fish. We are exploring possibilities of treating the fillets. A similar situation, though less severe, has been noted in the fuel-oil odor which has been observed at times in canned chum salmon. The iodine or muddy flavor occasionally found in flounders is also attributed to feeding conditions prior to capture. Such problems are exaggerated by holding noneviscerated fish for processing.

"If fish are left dead in gill nets they will deteriorate very rapidly, particularly at summer water temperatures. Studies of this type of quality deterioration demonstrate the importance of frequent gear lifts, and rapid cooling of fish by gill netters.

"We are learning that freezing of cod in prerigor condition produces mealy meat. This is a problem to be faced in freezing otter-trawl or trap-caught cod immediately after capture. Work is continuing on the advantages of freezing fish in rigor.

"The Board has pioneered in the development of antibiotics to inhibit bacterial spoilage. Two bulletins are available describing how they can be properly used. Tetracycline antibiotics are used effectively on the Atlantic coast, and intelligent application elsewhere is desirable.

"Low concentrations of polyphosphates appear to have some advantages over brine dips in maintaining texture, retarding oxidative rancidity, and reducing thaw 'drip'. However, commercial tests have not been consistent, and we have reservations about application by industry. Use is legal in the United States but not in Canada.

"There is a good deal of interest in the possible use of Cobalt-60 irradiation pasteurization to extend shelf life of fish. Low doses, 75,000 rads, double the shelf life of iced scallops and haddock fillets, from about 12 to 25 days. Heavier doses increase shelf life still further, but they also produce undesirable tastes and odors.

Canada (Contd.):

Use of irradiation is still expensive and controversial, but approval of its use by the United States Army for bacon, and the construction of a commercial test unit for fish at Gloucester indicates that you should keep your eyes on developments in this field. Our current irradiation studies are on lobster meat.

"Freeze-drying is being studied. The major problem is still with texture, but potential use for shredded or cubed fish in such products as dehydrated soups is worth watching.

"High quality fish-protein concentrates has been produced by the Board, and samples are being tested by several firms interested in high protein additives to foods, but to date application has not gone beyond the pilot-plant stage in Canada.

"Research on fish oils is demonstrating their usefulness for food products, detergents, and additives to lubricating oils. Canada imported 50 million pounds of oils in 1962 and this might well be reduced. A Board process for converting fish oils to methyl esters is now being used by a United States firm for processing menhaden oil. It is quite suitable for a large-scale Canadian herring reduction operation.

"We will soon have a bulletin available on specialty products which can be produced from some of our underexploited fresh-water fishes. Fish sausages and wieners, or canned and smoked products, can be made to meet market demands. Competition with smoked meat, and specialty fish products from overseas, appears to be blocking application in Canada.

"A current Board project shows that vacuum canning facilitates removal of water from such products as herring, and undesirable volatile components are readily drawn off. An added advantage is that the more rapid cooling during precooking shortens processing time.

"Finally, I should mention the recent distribution to industry of our circular on botulism. It is hoped that the document will serve to place this problem in its proper perspective, and allay some of the fears recently associated with marketing of fresh-water fish.

"Future Communication: I would like to conclude with three specific proposals for improved Canada-first research-industry communication:

"Firstly, the Information Service of the Department of Fisheries might employ an officer who would spend his full-time writing up research results in language and format which are more attractive to industry than the dry jargon of scientists.

"Secondly, the Board might employ a senior technological research scientist in each major area of the country with the full-time assignment of rapid authoritative communication of research results to industry, and industry problems to scientists.

"And Thirdly, the Fisheries Council might give consideration to action required by industry if it is to keep well informed concerning the increasingly voluminous research information which can be applied." (Bulletin of the Fisheries Council of Canada, Ottawa, September 1964.)

* * * * *

SALMON AND TROUT RESTOCKING PROGRAM IN QUEBEC:

The four fish hatcheries of the Department of Tourism, Fish and Game, Province of Quebec, have been grouped under one administration to intensify the restocking program of Quebec's lakes and streams, in an effort to improve fishing conditions. That section of the Wildlife Branch is now called the Restocking Division, and the four stations at Saint-Faustin, Tadoussac, Gaspé, and the Eastern Townships are charged with the responsibility of improving and increasing the fishing stock in all parts of the Province.

Another phase of the work is selling of part of the yearly production of eggs to private hatcheries. Eight species of fish are bred: speckled trout, brown trout, rainbow trout, lake trout, and moulac (splake) trout; salmon, ouananiche, and maskinonge. The speckled trout alone comprise 63 percent of the gross production, salmon about 27 percent, and the other species a little more than 10 percent.

In 1962 and 63, the Restocking Division of the Department sold 3,469,000 speckled trout eggs, 112,500 lake trout eggs, and 139,000 salmon eggs. Some 700,000 Atlantic salmon eggs have been exchanged with or given to foreign countries. Early in 1964, the Minister of Tourism, Fish and Game, offered in the name of the Province of Quebec, a gift of 50,000 salmon eggs to the Fédération départmentale des Associations Françaises de Pêche et de Pisciculture des Côtes-du-Nord. The French Federation received the eggs in a very healthy condition and they were planted in the rivers of Britanny, close to Saint-Malo.

There is a large demand in Europe and the United States for Atlantic salmon eggs and the Canadian Restocking Division exchanges them for brown and rainbow trout eggs. (The Atlantic Salmon Journal, June 1964, No. 2.)

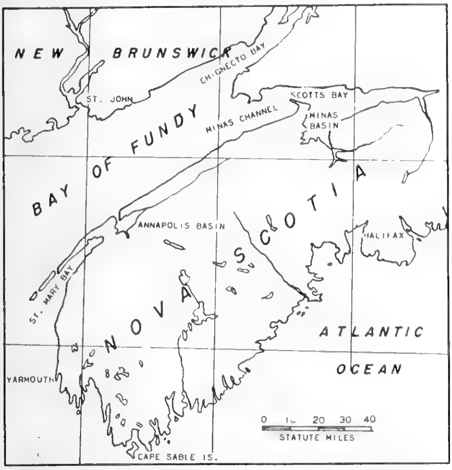
* * * * *

SECTION OF BAY OF FUNDY REOPENED TO HERRING SEINERS:

A large section of the New Brunswick side of the Bay of Fundy, which had been closed to herring seiners during the summer months and was to have remained closed until November 15, 1964, has been reopened for those operations, announced the Canadian Fisheries Minister on October 8. The area concerned lies in a northwesterly direction from a line

Canada (Contd.):

connecting Split Rock, in Saint John County, to Gannet Rock Light, which is south of Grand Manan Island in Charlotte County, but does not include Passamaquoddy Bay, north of Campobello and Bliss Islands. This smaller area is permanently closed to herring seiners.



The Fisheries Minister stated that full analysis had been given to the situation and that the decision to reopen the area at an earlier date had been made after complete consideration of all factors involved. (Canadian Department of Fisheries, Ottawa, October 8, 1964.)

Ceylon

YUGOSLAV-BUILT FISHING TRAWLER DELIVERED:

The first of 5 Yugoslav-built fishing trawlers was delivered this past fall to Ceylon. The trawlers, which reportedly will cost about US$210,000 each were the subject of a Ceylonese-Yugoslav long-term loan agreement signed in September 1962. The delivery dates of the remaining four trawlers was not known. (United States Embassy, Colombo, October 2, 1964.)

Note: See Commercial Fisheries Review, August 1962 p. 58.

Chile

NEW FISH MEAL FACTORY PLANNED:

A new $1.5 million fish meal plant in Iquique is planned by a Chilean manufacturing company which has previously concentrated on paper and pulp interests. The Chilean firm is reported to have received an offer from a Danish company to provide equipment for the new plant under the following terms: 15 percent down with the balance payable in semiannual installments over the 5-year period following shipment of plant materials and equipment. No bank guarantee would be required. A German firm is said to have made a similar offer. (United States Embassy, Santiago, September 22, 1964.)

Congo-Brazzaville

FISHERIES EXPANSION BEING CONSIDERED:

The commercial fishing and fish marketing activity of Congo-Brazzaville is centered at that country's seaport city of Pointe-Noire. There are two fish-freezing-canning plants in the city, one of which is financed by a United States tuna-packing firm in association with two French companies. The United States-French combine operates a 14,000-ton tuna freezing and temporary cold-storage plant. Another separate firm (French) cans tuna and pilchard.

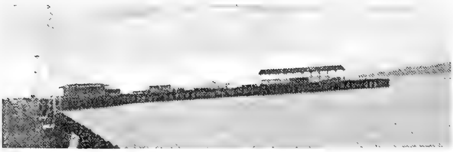
The Congo-Brazzaville total fish catch in 1963 amounted to 7,694 metric tons. Sardines are caught off its coast, as well as tuna and pilchard.

It appears that Pointe-Noire is thought in some quarters to be a suitable site for additional fishing and canning facilities and the Congo-Brazzaville Government has emphasized the need for further economic expansion in that area. (United States Embassy, Brazzaville, October 2, 1964.)

Costa Rica

FISHERIES TRENDS, THIRD QUARTER 1964:

Pacific Shrimp Fishery: A leading Costa Rican shrimp firm, based at Puntarenas on the west coast, has increased its shrimp fleet to 10 vessels. The firm also buys shrimp at auction from several independent vessels. The company (which has the participation of a United States investor) exports frozen shrimp to the United States, mainly through Miami, Fla. The firm recently received a 6-ton shipment of semiautomatic grading and processing equipment, and is also installing increased refrigeration facilities in its plant on the Puntarenas Estuary.



Pier at Puntarenas, Costa Rica.

Two other shrimp firms are located on Costa Rica's Pacific coast. Most of their production is for the domestic market, any surplus being sold to the Puntarenas exporting firm described above. It is estimated that, on the average, 30 vessels fish for shrimp on Costa Rica's west coast. There is considerable variation in the fleet as vessels move from one fishery to another.

Caribbean Spiny Lobster Fishery: The spiny lobster fishing industry of Limon Province on Costa Rica's east coast depends on the movements of a migratory spiny lobster species (*Panulirus argus*). Between September and January, gravid females arrive along the coast. They are protected by conservation measures. The Costa Rican spiny lobster season in the Caribbean opens when male spiny lobsters start to arrive in October. They arrive from the north, apparently following the ocean currents prevailing during that time of year. The main harvest lasts from November to February and ordinarily by the middle of March the last spiny lobsters have departed. The size of the migratory population appears to follow a cyclical trend, but no accurate data is available to establish the cycle and predict future harvests.

Recently a French firm applied to Costa Rica for permission to fish for spiny lobsters off the Costa Rican east coast, using ocean-going vessels with nets. The company planned to use 3 vessels ranging from 250 to 300 tons. There was strong opposition from local fishermen, and the request of the French firm was denied by the Government of Costa Rica.

In early fall 1964, large numbers of spiny lobsters were arriving off Limon, stirring optimism about the 1964/65 season.

Marine Turtles: A Japanese visitor was in Costa Rica in early 1964 studying the possibility of expanding the marine turtle fishery. Two new Costan Rican companies were formed to participate in the turtle fishery, and the Japanese visitor returned to Japan, reportedly to interest Japanese investors in the two companies. (United States Embassy, San Jose, October 2, 1964.)

Cuba

EXPANDED FISHERIES CLAIMED RESULT OF SOVIET AID:

The Second Session of the joint Soviet-Cuban Fisheries Commission opened in Moscow, September 1, 1964. According to the Soviet Fisheries Minister, who was the principal speaker, the Cuban fishing industry has now been established and is showing excellent results, with fishery landings almost doubled in a few years. He also mentioned the development, with Soviet help, of a deep-sea fishing fleet and the newly-built processing plants that will make it possible to handle the increased catch and satisfy the Cuban demand for fishery products.

Cuba (Contd.):

The meetings of experts which followed the opening session discussed mainly the increased cooperation in the field of fisheries between Cuba and the Soviet Union during 1965. The most important decisions made at those meetings were:

1. The Soviet Union will make available to Cuban scientists all reports on its fishery research in the Atlantic Ocean.

2. In 1965, two modern fishery research vessels will be sent to Cuba.

3. Over 70 Soviet fishery specialists will go to Cuba to instruct in various phases of the fishing industry.

4. About 100 Cuban students will be sent to the Soviet Union to study in Soviet universities and specialized fishery schools.

Note: See Commercial Fisheries Review, November 1964; June 1963 p. 68.

Denmark

COPENHAGEN FISHERIES TRADE FAIR HELD IN SEPTEMBER 1964:

The Fifth International Fisheries Trade Fair (sponsored by the Danish fishing industry) was held September 11-20, 1964, in Copenhagen. The products displayed by 200 exhibitors from 14 countries ranged from electronic fish-detectors to plastic fish containers. Manufacturers of marine motors and fishing nets had the largest number of exhibits at the Fair. A Swedish manufacturer gave floor demonstrations of several fish-processing machines, including one for filleting herring. That 2-man machine is said to have a capacity per minute of 250-300 herring (size $6\frac{1}{2}$ to $10\frac{1}{2}$ inches).

The Association of Fish Exporters of Denmark set up a special desk at the Fair to give visitors information regarding Danish fishery products for export.

The Fair attracted more buyers from Germany, Norway, and Denmark than any previous Copenhagen fisheries trade fair, although the overall attendance of 36,578 visitors at the Fifth International Fisheries Trade Fair did not match that of the last fair. (Assistant Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, September 30, 1964.)

Note: See Commercial Fisheries Review, April 1964 p. 57.

El Salvador

FISHERIES TO BE AIDED BY UNITED NATIONS SPECIAL FUND:

A 13-man team of fishery experts is expected to arrive in El Salvador early in 1965

to provide technical assistance to the local fishing industry. The team is a part of a US$1.5 million six-year assistance program to Central America to be financed from the United Nations Special Fund. The program was drawn up at the request of the Ministers of Agriculture of the five Central American countries earlier this year. It is understood that one of the projects to be carried out will be an 18-months survey of deep-water shrimp resources.

Red Shrimp Fishery: El Salvador's Minister of Economy has announced that licenses to engage in deep-sea red-shrimp fishing will not be granted to individuals, but only to companies or corporations. The Ministry's decision reportedly was based on the large investment needed to engage in red-shrimp fishing. To encourage the immediate start of such a fishery, the Ministry is prepared to grant two-year concessions to local operators to lease United States or Mexican vessels. After the two-year trial period, the local companies are expected to be in a position to acquire their own vessels or equipment.

According to a Ministry official, there is considerable investor interest, both local and foreign, in a red-shrimp industry.

El Salvador (Contd.):

Tuna Fishery: The El Salvador Government has been disappointed at the lack of progress in developing a local tuna fishing industry. Although a considerable number of local investors had applied for and been granted licenses to engage in tuna fishing, no such fishing had been done as of this past fall, and most of the licenses granted expired or became invalid because of noncompliance with the terms of issuance which required the beginning of tuna fishing within six months after authorization.

The Government feels that one reason for the lack of progress is the high cost of the vessel and equipment needed for tuna fishing. Another reason may be the lack of facilities to handle and process the tuna that might be caught. There have been rumors from time to time of the establishment of tuna-canning facilities in the country, but nothing has materialized. In this connection, however, the Salvadoran Industrial Development Institute (INSAFI) conducted and completed a market and feasibility study for a tuna canning operation and positive developments may be forthcoming.

Fresh-Water Fishery: This past July, the Pisciculture Section of the Ministry of Agriculture released a little over 4,000 Tilapia mozambica in El Salvador's three principal rivers.

There were some reports that there was a shortage of fish in Lake Coatepeque and that it created an economic hardship to some 300 to 400 fishermen who earn their livelihood from the lake. Supposed spokesmen for the fishermen reported that the fish catch in the lake has been declining steadily since the Government planted about 400 Mojarra azul (Cichlasoma guttulatum) about five years ago. The spokesmen recommended that the Government plant Guapote tigre (Chichlasona managüense) and Lobina negra (Micropteros salmoides) instead. The Government insists that the fish it planted is not carnivorous and that the two species recommended are.

The controversy was reported to be basically the old one of sport fishing versus commercial fishing. The so-called spokesmen for the fishermen did not gain their livelihood from fishing, it was reported, and were interested in having the lake stocked with game fish for their own personal business reasons. The Government was said to have produced several fishermen who said they make a reasonable living catching and selling the Mojarra azul. There was no overall shortage of fish in the lake, they said, just a shortage of game fish. (United States Embassy, San Salvador, September 30, 1964.)

Fiji Islands

EX-VESSEL TUNA PRICES AT JAPANESE BASE:

The following ex-vessel prices as of early October 1964 were being paid for top quality long-line caught tuna landed at the Japanese tuna base located at Levuka, Fiji Islands:

Species	Price	
	Yen/Kg.	US$/Short Ton
Albacore (round)	110	277
Yellowfin (gilled & gutted):		
Small (10-36 kg.)1/	85	214
Medium (36-45 kg.)2/ . . .	85	214
Large (over 45 kg.)3/	70	176
Big-eyed (gilled & gutted) (over 15 kg.)4/	55	139
Bluefin (gilled & gutted)	60	151

1/22-79 lbs.
2/79-99 lbs.
3/Over 99 lbs.
4/Over 33 lbs.

The above prices were to be effective August 12-December 31, 1964. The price of second quality fish was one-half that for top quality fish. All prices are subject to negotiation after December 31, 1964, if changes in price structure should occur before that date at other nearby tuna bases (e. g., American Samoa and New Hebrides). (Suisan Keizai Shimbun, October 11, 1964.)

France

HERRING IMPORTS FROM OTHER EEC COUNTRIES SUBJECT TO MINIMUM PRICE REGULATIONS:

A complicated mechanism to withhold French import licenses from herring offerings from other European Economic Community (EEC) countries, after prices in the French market sink below a stated minimum for 3 successive days, has been established by France (Journal Officiel, September 23, 1964). The new system is to be in effect from September 23, 1964, until February 15, 1965, and may be extended for an additional period.

France (Contd.):

In a letter to the EEC Commission, the French Government had previously noted that large herring imports from the other EEC countries were disturbing the local herring market and endangering the financial structure of the French fishing industry. It was further noted that herring from the Netherlands had been offered at 0.35 French franc per kilogram (about 3 U.S. cents a pound) free at France's border, while the average price for French herring varied from 0.70 to 1 franc a kilogram (6.5 to 9 cents a pound).

About 24 percent of France's herring imports in 1963 were from the Netherlands. A report of the Netherlands Ministry of Agriculture and Fisheries shows that Dutch exports of fresh herring to France amounted to 6,200 metric tons with a value of about Fl.2.4 million (US$662,000) in 1963 as compared with exports to all countries totaling 21,748 tons worth about Fl.14.7 million ($4.1 million). Also, in 1963 the Netherlands exported to France 4,433 tons of salted herring valued at Fl.2.7 million ($745,000), and 1,468 tons of mackerel worth Fl.617,000 ($170,000).

The new price maintenance and import regulation program will probably be confined to herring, because French fishermen are not as sensitive to imports of other species. Tuna, for example, is imported in sizable quantities, but it is more easily absorbed by the local market. Another reason that the French Government might be reluctant to extend the program is that herring enter France only at Boulogne-Sur-Mer, and thus price control services need be established only at that port. However, extending the scheme to include other fish, and thus other ports of entry and sale, would require a new government service to observe and control prices; an operation considered technically feasible but very expensive to administer. (United States Embassy, Paris, October 15, 1964, and United States Embassy, The Hague, September 15, 1964.)

Notes: (1) Netherlands florin (or guilder) 3.613 equal US$1.00.
(2) French franc 4.90 equal US$1.00.

* * * * *

FRANCE SETS MINIMUM PRICES ON HERRING IMPORTS:

The French Government recently informed the European Economic Community Commission (EEC) and its five EEC partners that starting September 21, 1964, minimum prices for imported herring would be applied. In a letter to the EEC Commission, the French Government noted that large herring imports from the other EEC countries were disturbing the local herring market and endangering the financial structure of the French fishing industry. It was further noted that herring from the Netherlands had been offered at 0.35 French franc per kilogram (about 3 U.S. cents a pound) free at France's border, while the average price for French herring varied from 0.70 to 1 franc a kilogram (about 6.5 to 9 cents a pound).

About 24 percent of France's herring imports in 1963 were from the Netherlands. A report of the Netherlands Ministry of Agriculture and Fisheries shows that Dutch exports of herring to France amounted to 6,200 metric tons with a value of about Fl.2.4 million (US$662,000) in 1963 as compared with exports to all countries totaling 21,748 tons worth about Fl.14.7 million ($4.1 million). Also, in 1963 the Netherlands exported to France 4,433 tons of salted herring valued at Fl.2.7 million ($745,000), and 1,468 tons of mackerel worth Fl.617,000 ($170,000).

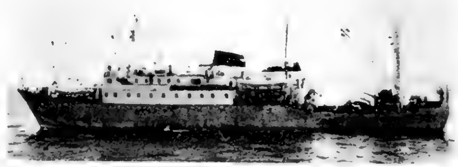
The Netherlands Ministry of Agriculture and Fisheries had not yet received the French "declaration of intent" and was unable to comment on which products would be affected by the French move.

Note: One Florin or guilder equals $0.276.
One French franc equals $0.204.

German Democratic Repubic

FISHING FLEET PLANNED FOR ATLANTIC FISHERIES:

The Institute of High Sea Fishing at Rostock-Marienehe in East Germany has begun intensive scientific preparations aimed at an early entry of the East German fishing fleet into the Northwest and Southwest Atlantic



"Tropik"-class large stern trawler and freezer.

German Democratic Republic (Contd.):

fisheries. As the basis for this work, the Institute is relying heavily on Soviet and Polish scientific fishery literature dealing with those two Atlantic fishing areas. (Le Marin, August 28, 1964.)

East Germany's delivery of 65 "Tropik" class vessels (stern trawlers and freezers) for the Soviet Union is to be completed by 1965. From available information, it seems that East Germany will continue the construction of "Tropik"-class fishing vessels for her own fleet, after fulfilling the contract with the Soviets.

Ghana

LARGE TRAWLER BUILT BY JAPAN:

The first of 10 stern trawlers contracted for delivery to a Ghana fishing corporation was completed at a shipyard in Japan. It is being equipped for its maiden voyage at the port of Tobata. The 1,980-gross-ton vessel will be manned by 25 Japanese nationals who will train Ghanaian nationals in the vessel's operation and in fishing techniques.

The vessel's specifications are: length--72 meters (236 feet); beam--12.5 meters (41 feet); speed--14.6 knots.

The second trawler for delivery to Ghana was scheduled for completion in late November 1964. (Minato Shimbun, October 13, 1964.)

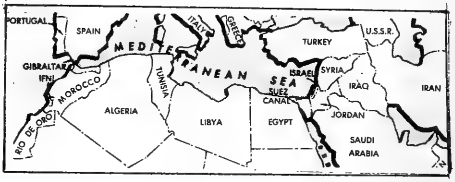
Note: Earlier press reports indicated Ghana had contracted for delivery of twelve 1,800-ton trawlers.

Greece

FREEZER-TRAWLER LANDINGS AND FISHERY TRENDS, JULY 1964:

Landings: The Greek fleet of refrigerated trawlers and carrier vessels operating in the Atlantic landed 2,335 metric tons of frozen fish in Greek ports in July 1964. That was about the same as the 2,343 tons landed in June 1964, but much above the 801 tons landed in July 1963.

Greek frozen fish landings during January-July 1964 amounted to 11,985 tons, compared



with landings of 10,396 tons in the same period of 1963, and 8,672 tons in the first 7 months of 1962.

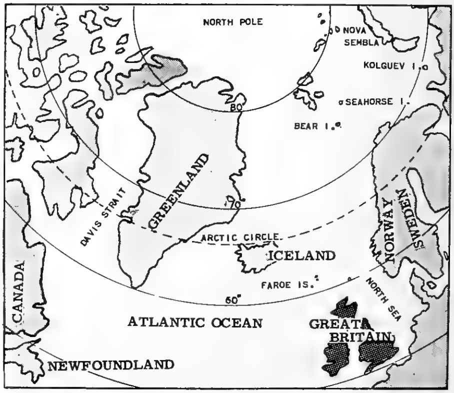
Atlantic Exploratory Trawling Project: It has been reported that the Fisheries Department of the Greek Government will charter a freezer-trawler for exploratory fishing in the Atlantic. The Greek Government will contribute Dr 2.5 million (US$83,333) of the Dr 3.0 million ($100,000) needed for the exploratory operation. The remaining Dr 0.5 million ($16,667) will be contributed by the Greek freezer-trawler companies. A primary objective of the project is to locate new trawling grounds. (Alieia, August 1964.)

Notes: (1) Greek drachma 30.0 equals US$1.00.
(2) See Commercial Fisheries Review, Nov. 1964 p. 84.

Greenland

FISHING RIGHTS AGREEMENT SIGNED WITH FAROE ISLANDS:

Revision of the fisheries agreement between the local governments of Greenland and the Faroe Islands was signed in Godthaab,



Greenland (Contd.):

Greenland, on September 19, 1964. The revision grants the Faroese the rights to establish and maintain until 1975 another fisheries station in East Greenland and continues the present rights of Greenlanders to fish in Faroese waters.

The new agreement falls far short of meeting the demands of the two parties. The Greenlanders originally insisted that the Faroese should close their fisheries stations in Greenland and land their catches at the new local Greenland fish plants, while the Faroese wanted fishing rights in Greenland waters equal to those granted resident vessels. Both demands were dropped in the final agreement. (United States Embassy, Copenhagen, September 23, 1964.)

Note: See Commercial Fisheries Review, October 1964 p. 57.

Iceland

HERRING EX-VESSEL PRICES SET:

Effective October 1, 1964, minimum ex-vessel prices for south and west coast herring were set by the Icelandic Fishing Industries Price Committee as follows:

(1) Herring for freezing, salting, and filleting--Kr.1.70 per kilo (1.79 U.S. cents per pound).

(2) Iced herring for export or for canning--Kr.1.55 per kilo (1.63 U.S. cents per pound).

(3) Herring for reduction--Kr.1.02 per kilo (1.07 U.S. cents per pound).

(4) Herring for animal feed--Kr.1.25 per kilo (1.32 U.S. cents per pound).

The prices are for herring delivered to transport vehicles at dockside. In the case of herring for reduction, vessel owners are asked to deliver the catch directly to the factory, and they receive a small additional payment to cover transportation charges.

In addition to the above minimum prices, the price for small herring (5-19 herring per kilo) caught from March 1 to September 30, 1965, for freezing was fixed at Kr.1.27 per kilo (1.34 U.S. cents per pound).

The new prices represent a considerable change from 1963. The comparable minimum ex-vessel price in 1963 for herring for salting was Kr.1.42 per kilo (1.50 U.S. cents per pound) and for herring for filleting it was Kr.1.12 per kilo (1.18 U.S. cents per pound). The ex-vessel price for herring for freezing in 1963 was Kr.1.84 per kilo (1.94 U.S. cents per pound). The 1964 freezing price is down 7.6 percent from the previous year, but the 1964 salting and filleting prices are considerably above comparable 1963 prices. (United States Embassy, Reykjavik, October 6, 1964.)

Note: Icelandic Kronur 43.06 equal US$1.00.

* * * * *

FISHERY LANDINGS BY PRINCIPAL SPECIES, JANUARY-MAY 1964:

Species	January-May	
	1964	1963
	. . (Metric Tons) . .	
Cod	240,889	176,938
Haddock	24,714	23,468
Saithe	12,250	5,273
Ling	2,826	3,676
Wolffish (catfish)	6,858	9,637
Cusk	2,719	4,517
Ocean perch	8,630	11,875
Halibut	331	406
Herring	72,497	96,050
Shrimp	89	349
Capelin	8,640	1,077
Lobster	254	72
Other	2,078	1,681
Total	382,775	335,019

Note: Except for herring which are landed round, all fish are drawn weight.
Source: Aegir, September 1, 1964.

* * * * *

FISHERY LANDINGS BY PRINCIPAL SPECIES, JANUARY-JUNE 1964

Species	January-June	
	1964	1963
	. . (Metric Tons) . .	
Cod	247,140	194,663
Haddock	27,140	26,003
Saithe	14,294	6,810
Ling	3,175	3,851
Wolffish (catfish)	7,182	10,942
Cusk	2,745	4,719
Ocean perch	11,534	14,718
Halibut	479	502
Herring	152,611	134,497
Shrimp	138	349
Capelin	8,640	1,077
Lobster	1,228	1,559
Other	3,350	2,862
Total	479,656	402,552

Note: Except for herring which are landed round, all fish are drawn weight.
Source: Hagtidindi, September 1964

* * * * *

Iceland (Contd.):

UTILIZATION OF FISHERY LANDINGS, JANUARY-MAY 1964:

How Utilized	January-May	
	1964	1963
	. . (Metric Tons) . .	
Herring 1/ for:		
Oil and meal	59,642	65,570
Freezing	9,624	17,388
Salting	3,231	7,475
Fresh on ice	-	5,617
Groundfish 2/ for:		
Fresh on ice	17,235	16,929
Freezing and filleting	119,738	97,271
Salting	78,543	59,025
Stockfish (dried unsalted)	78,035	56,903
Canning	24	35
Home consumption	5,943	6,080
Oil and meal	1,777	1,227
Capelin for:		
Freezing	133	188
Oil and meal	8,507	889
Shrimp for:		
Freezing	53	267
Canning	36	82
Lobster for:		
Fresh on ice	-	2
Freezing	254	71
Total production	382,775	335,019

1/ Whole fish.
2/ Drawn fish.
Source: Aegir, September 1, 1964

* * * * *

UTILIZATION OF FISHERY LANDINGS, JANUARY-JUNE 1964:

How Utilized	January-June	
	1964	1963
	. . (Metric Tons) . .	
Herring 1/ for:		
Oil and meal	146,766	103,216
Freezing	11,161	19,153
Salting	3,231	7,475
Fresh on ice	-	5,617
Groundfish 2/ for:		
Fresh on ice	19,310	18,756
Freezing and filleting	128,818	109,955
Salting	80,502	63,314
Stockfish (dried unsalted)	79,125	63,923
Canning	117	149
Home consumption	7,052	7,078
Oil and meal	2,208	2,008
Crustacea for:		
On ice	-	2
Freezing	1,330	1,824
Canning	36	82
Total production	479,656	402,552

1/ Whole fish.
2/ Drawn fish.
Source: Hagtidindi, September 1964

Italy

ATLANTIC FISHING FLEET, 1964:

Early in 1964, the Italian fishing fleet operating in the Atlantic consisted of 51 vessels, according to the Federazione Nazionale delle Imprese di Pesca. The Italian Atlantic fleet had a combined gross tonnage of about 24,400 tons. It included 5 vessels of over 1,000 gross tons (totaling 7,500 tons); 10 vessels of from 500 to 1,000 gross tons (totaling 6,400 tons); and 36 vessels under 500 gross tons (totaling 10,500 tons).

Typical Italian trawler that fishes in the Atlantic. Larger ones have been built in recent years.

In 1964, Italian shipyards were reported to be building for the Atlantic fleet an additional 16 vessels with a combined gross tonnage of 6,500 tons. The new construction includes 4 freezer-trawlers being built in Viareggio and 2 tuna vessels being built in Venice.

New Freezer-Trawlers: The 4 freezer-trawlers being built at Viareggio have the following characteristics: length overall 57.46 meters (188.5 feet), length between perpendiculars 50.55 meters (165.8 feet), draft with full load 3.7 meters (12.1 feet), size of refrigerated hold 500 cubic meters (654 cubic yards), and gross tonnage 499 tons. Each vessel will have a 1,065-horsepower engine which will give a speed of 12.5 knots.

The 4 freezer-trawlers are designed to operate in tropical waters. They will each have a -40° C. (-40° F.) quick-freezing plant with a potential capacity of 15 tons every 24 hours, and a cold-storage hold with temperature of -25° C. (-13° F.). They are also equipped with electrical winches, 2 echo-sounders, radiotelephone, and a radar set with a radius of 50 miles. Each vessel has air-conditioned quarters for a crew of 36.

The first of the new Viareggio freezer-trawlers was launched April 9, 1964. Prefabricated construction methods are speeding the completion of the other three.

New Tuna Vessels: The new Atlantic tuna vessels being built in Venice will each have a length of 66 meters (216.5 feet), a main engine of 1,400 horsepower, and a gross tonnage of about 750 tons. (La Pesca Italiana,

Italy (Contd.):

January and February 1964; Corriere della Pesca, April 1964.)

* * * * *

FISH CONSUMPTION:

Consumption of fishery products in Italy was estimated at about 5.4 kilograms (11.9 pounds) per capita in 1961 (270,000 metric tons of fish were available for consumption by 50 million inhabitants). A public opinion study by a research institute has probed further into Italian fish-buying habits. The study was based on a sample of 4,000 families from various regions and social groups.

An area sample (during an average week) showed that 38 percent of the fish-consuming families were in southern Italy, 18 percent in central Italy, 19 percent in northeast Italy, and 25 percent in northwest Italy. The highest rate of fishery purchases was found in the island Province of Sardinia. Families on farms and in small towns had lower average fishery purchases than families in cities.

The survey also showed that young housewives buy the most fish; half the families in which the housewife was less than 35 were fish consumers, but the ratio dropped to one-third when the housewife was older. (La Pesca Italiana, February 1964.)

Japan

FROZEN TUNA EXPORT PRICES:

Japanese frozen albacore (round) exports from Japan proper to the United States continued slow in early October 1964, with export prices down to US$355-360 a short ton c. & f. Japanese Atlantic-caught albacore delivered to transshipment ports brought around $295-300 a short ton.

On the other hand, the price of frozen yellowfin (gilled and gutted) exported from Japan proper to the United States held steady at $350-355 a short ton c. & f. (Suisan Tsushin, October 12, 1964.)

* * * * *

EXPORT VALIDATIONS FOR FROZEN TUNA AND TUNA LOINS TO U.S., JANUARY-AUGUST 1963-64:

Japan's export validations of frozen tuna and frozen tuna loins to the United States in August 1964 totaled 12,436 short tons. Of that total, 55 percent of the validations were for albacore tuna, 42 percent for yellowfin, 0.5 percent for skipjack, and 2.2 percent for tuna loins.

During January-August 1964, Japan's export approvals amounted to 75,755 short tons, an increase of 25,227 tons

Japan's Export Validations for Frozen Tuna and Tuna Loins to U.S. January-August 1964 with Comparisons

Species	Aug. 1964			Jan.-Aug. 1964			Jan.-Aug. 1963		
	Direct	Trans-shipped	Total	Direct	Trans-shipped	Total	Direct	Trans-shipped	Total
	. . . . (Short Tons)								
Albacore, round	1,387	5,470	6,857	17,036	23,693	40,729	5,215	17,145	22,360
Yellowfin:									
Round	-	325	325	-	941	941	-	468	468
Gilled & gutted:									
20/100 lbs.	3,959	166	4,125	18,720	2,348	21,068	13,408	3,665	17,073
100 lbs. up	257	-	257	1,774	-	1,774	-	-	-
Drsd. with tail	-	531	531	25	3,307	3,332	671	3,191	3,862
Fillets	-	-	-	33	12	45	227	104	331
Total	4,216	1,022	5,238	20,552	6,608	27,160	14,306	7,428	21,734
Big-eyed:									
Gilled & gutted:	-	-	-	30	30	60	20	4	24
Drsd. with tail	-	-	-	-	170	170	-	240	240
Fillets	-	-	-	37	3	40	6	42	48
Total	-	-	-	67	203	270	26	286	312
Bluefin fillets	-	-	-	-	1	1	-	374	374
Skipjack, round	-	66	66	8	2,866	2,874	70	2,312	2,382
Loins:									
Albacore	80	-	80	2,197	-	2,197	1,342	-	1,342
Yellowfin	195	-	195	2,524	-	2,524	1,867	-	1,867
Bluefin	-	-	-	-	-	-	157	-	157
Total	275	-	275	4,721	-	4,721	3,366	-	3,366
Grand Total	5,878	6,558	12,436	42,384	33,371	75,755	22,983	27,545	50,528

Source: Japan Frozen Food Exporters Association.

Japan (Contd.):

or 49.9 percent as compared with 50,528 tons exported during the same period in 1963. On a species basis albacore exports were up 82.2 percent, yellowfin 25 percent, skipjack 20.7 percent, and tuna loins 40.3 percent. Big-eyed exports were down 15.6 percent.

Frozen tuna approved for export during January-August 1964 amounted to 93.8 percent of the total exported during the entire year in 1963. (Fisheries Attache, United States Embassy, Tokyo, September 19, 1964.)

* * * * *

ATLANTIC OCEAN ALBACORE TUNA FISHERY AND MARKET TRENDS:

The Japanese albacore tuna fishery in the Atlantic Ocean off Angola, which in past years usually picked up in November, began exceptionally early this year, with excellent catches reported in September 1964.

Export prices of Japanese frozen round albacore delivered to West African ports were reported to range from US$295-300 a short ton. On the other hand, exports to Yugoslavia were at $405 a metric ton c.& f., and to Spain $380 a metric ton c.& f. From the standpoint of price, it is reported that it would be more advantageous to deliver tuna to the West African ports than to Spain. (Suisan Tsushin, September 25, 1964.)

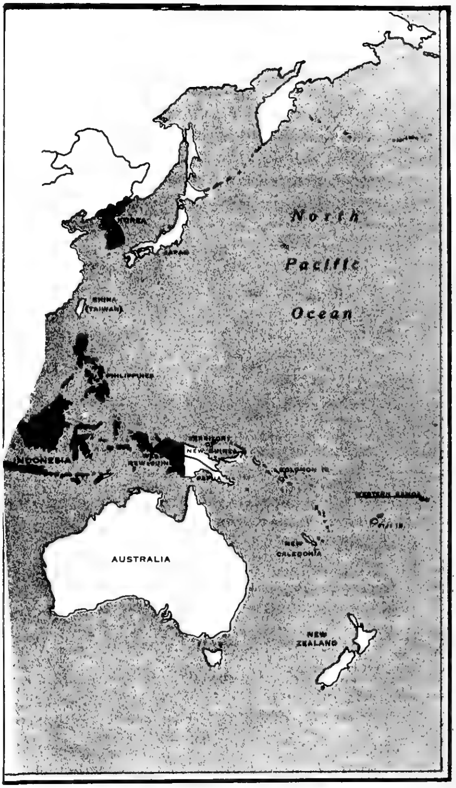
* * * * *

TUNA MOTHERSHIP OPERATIONS IN SOUTH PACIFIC:

A large Japanese fishing company's tuna mothership Shinyo Maru (3,800 gross tons) accompanied by 45 catcher vessels was scheduled to depart Tokyo on October 3 or 4, 1964, for the tuna fishing grounds off the Fiji Islands. The mothership's catch target is 5,500 metric tons of tuna, spearfish, and shark.

That same company's Yuyo Maru (5,500 gross tons) tuna mothership fleet, operating near the Fiji Islands, was reported to have landed 5,700 metric tons of tuna (nearly half yellowfin tuna) and other miscellaneous fish as of September 15, and was expected to return to its home port in Japan.

The tuna mothership Nojima Maru (8,800 gross tons) was scheduled to arrive at Kobe on September 28. The mothership, which commenced fishing May 26 in the vicinity of Tahiti, produced 1,974 metric tons of round albacore, 702 metric tons of gilled and gutted



yellowfin, and 843 tons of tuna fillets. (Suisan Tsushin, September 26; Suisancho Nippo, September 17, 1964.)

* * * * *

FISHING FIRM GRANTED LICENSE TO FISH WITH PURSE SEINES OFF AFRICA:

A license to fish for skipjack tuna and other fish species off the West Coast of Africa with purse seines was granted to a leading Japanese fishing company, according to Japan's Fishery Agency. In Japan, purse seines are used to catch skipjack, sardines, mackerel, horse mackerel, and several other species.

Operations of that fishing company will be based at Freetown (Sierra Leone), Abidjan

Japan (Contd.):

(Ivory Coast), and Cape Verde off Northwest Africa). Fishing will be conducted by two vessels, the Kuroshio Maru No. 81 and the Kuroshio Maru No. 82 (145 gross tons each). Those vessels were en route to the West African fishing grounds as of mid-September. The Chichibu Maru No. 2 (1,639 gross tons), which will act as the mothership for the fishing vessels, was scheduled to depart from Japan on September 17.

It is reported that the major portion of the skipjack tuna catch will be sold to a United States fish packing firm, now actively engaged in the purchase of fish in West Africa. (Fisheries Attache, United States Embassy, Tokyo, September 18, 1964.)

* * * * *

INDIAN OCEAN TUNA TRANSSHIPMENT PORTS DESIGNATED:

Durban, South Africa, and Port Louis, Mauritius Island, were formally designated as transshipment ports for the Indian Ocean by the Japan Export Frozen Tuna Producers Association at an executive meeting in Tokyo, October 12, 1964. Each of the two ports was granted frozen tuna export quotas of 2,000 metric tons. (Suisancho Nippo, October 14, 1964.)

* * * * *

LONG-LINE TUNA FISHERIES CATCH, 1963:

The 1963 catch of Japan's tuna long-line fisheries totaled 532,000 metric tons (0.4 percent less than in 1962) and comprised 7.9 percent of total fish landings, according to statistics released by the Fisheries Statistics Section, Ministry of Agriculture and Forestry. By species, the catch of yellowfin and albacore declined, respectively, 19,000 and 7,000 tons while the catch of bluefin and big-eyed increased, respectively, 11,000 and 3,000 tons.

By fishing grounds, the catch in the Pacific Ocean totaled 322,000 tons (down 10,000 tons), Atlantic Ocean 110,000 tons (up 13,000 tons), and Indian Ocean 100,000 tons (down 24,000 tons). (Suisan Keizai Shimbun, October 7, 1964.)

* * * * *

UNIVERSITY'S STUDY OF ATTRACTING DEEP-SWIMMING ALBACORE TUNA TO SURFACE:

The Tokai University of Japan announced in October 1964 the results of eight years of field testing different methods of attracting deep-swimming albacore tuna to the surface where they can be fished with pole-and-line gear. The study revealed that trolling a line to which 50-60 artificial (vinyl) squid and octopus are attached is very effective in attracting albacore to the surface, even to the stern of vessels. Hooks are not used, thereby avoiding the danger of hooked albacore escaping and scaring away the fish school.

There were some schools that could not be lured to the surface without chumming with live bait (sardines) and the laboratory is now planning to experiment with artificial sardine lures next year. (Suisan Keizai Shimbun, October 9, 1964.)

* * * * *

EX-VESSEL BLUEFIN TUNA PRICES IN NORTHERN JAPAN:

A 172-pound fresh prime bluefin tuna landed at the port of Shiogama, Miyagi Prefecture, Japan, brought the fabulous price of 2,260 yen a kilogram (US$5,696 a short ton). The bluefin was caught by a two-boat purse-seiner off the Sanriku coast.

At Hachinohe, Aomori Prefecture, 150 small fresh bluefin brought prices ranging from 500-787 yen a kilogram ($1,260-1,973 a short ton). (Suisan Keizai Shimbun, October 14, 1964.)

* * * * *

Japan (Contd.):

CANNED SALMON EXPORT PRICES:

The Japanese salmon mothership companies and trading firms have agreed on prices of 118 shillings (US$16.52) a case for 48 $\frac{1}{2}$-lb. cans and 140 shillings ($19.60) a case for 96 $\frac{1}{4}$-lb. cans f.o.b. Japan for canned silver salmon for export to Great Britain. The price, which includes three shillings ($0.42) for promotion, was scheduled to be formally passed on by the Canned Salmon Sales Company on October 18, 1964.

Reportedly, agreement was reached on an export price of 160 shillings ($22.40) a case (48 $\frac{1}{2}$-lb. cans) f.o.b. Japan for red salmon, but formal adoption of that price was not expected until early October. (Suisan Keizai Shimbun, September 27, 1964.)

* * * * *

JAPANESE CANNED SALMON SALE TO GREAT BRITAIN:

The Japanese Canned Salmon Sales Company, on October 19, 1964, released for the second sale to Great Britain a total of 156,000 cases of canned (fancy) red salmon, consisting of about 118,000 cases of 48 $\frac{1}{2}$-pound cans and 38,000 cases of $\frac{1}{4}$-pound cans. Sales were to be concluded by the end of December 1964. Canned red salmon sales for export to Great Britain, including the previous sale, as of mid-October totaled 550,000 cases of 48 $\frac{1}{2}$-pound cans and 200,000 cases of $\frac{1}{4}$-pound cans. (Suisan Tsushin, October 20, 1964.)

Japanese Export Canned Salmon Prices, c.i.f. Great Britain, 1964

Can and Case Size	Second Sale		First Sale	
	s./d.	US$	s./d.	US$
	.... (Price Per Case)			
$\frac{1}{2}$-lb. 48 cans	160/0	22.40	153/6	21.49
$\frac{1}{4}$-lb. 48 cans	102/6	14.35	99/3	13.90
$\frac{1}{4}$-lb. 96 cans	202/6	28.35	196/0	27.44

* * * * *

POSTPONEMENT REQUESTED IN SALE OF ALASKA SALMON:

Representatives of the Hokkaido (Japan) coastal fishery operators and trap-net operators petitioned the Fisheries Agency to postpone the release on the Japanese market of "poor-quality" salted salmon purchased from Prince William Sound, Alaska. They feared it would adversely affect the sale of domestic-caught salmon. Approximately 1,080 metric tons of Alaska salmon found unsuitable for canning (for export) were reported to have been salted for sale on the Japanese domestic market. (Suisan Tsushin, October 12, 1964.)

* * * * *

EX-DOCK PRICE FOR CHUM SALMON:

The beach or ex-dock price of fall chum salmon in Hokkaido, Japan, on September 15, 1964, reached a high of 500 yen a kilogram (US$0.63 a pound) for females and 300 yen a kilogram ($0.38 a pound) for males. On September 17, the price declined to 470 yen a kilogram ($0.59 a pound) for females and 250 yen a kilogram ($0.32 a pound) for males.

The chum salmon are being processed as "Aramaki" (lightly salted salmon) for the New Year's trade. (Minato Shimbun, September 29, 1964.)

Note: The fall chum salmon trap fishery in Japan begins generally in mid-September and peaks in October. Female salmon command high prices because of their roe, which is highly prized in Japan.

* * * * *

MORE TRAWLERS TO FISH IN GULF OF ALASKA:

The Japanese Fisheries Agency is planning on authorizing the operation of 3 to 4 additional trawlers in the Gulf of Alaska in 1965. This will increase the Japanese trawl operations in the Gulf to a total of 10 vessels, including the 6 trawlers presently authorized to conduct experimental operations in that area. The Agency is also planning on establishing the Gulf of Alaska trawl fishery as a regular licensed fishery, depending on the outcome of the Annual Meeting of the International Northwest Pacific Fisheries Commission which convened in Tokyo, November 16, 1964. (Suisan Tsushin, October 12, 1964.)

* * * * *

BERING SEA BOTTOMFISH CATCH, 1964:

A study made by the Japan Northern Waters Bottomfish Mothership Council reveals that the Bering Sea catch of the 14 mothership-type bottomfish fleets, as of September 20, 1964, totaled 394,000 metric tons, far exceeding the 1963 catch of 311,000 metric tons. Alaska pollock (117,000 metric tons), flatfish (88,000 tons), herring (42,000 tons), and rockfish (38,000 tons) led the landings. Catch of halibut (2,000 tons) and sablefish (6,000 tons) was poor as compared to other years.

Japan (Contd.):

Typical Japanese trawler operating with the Tenyo Maru mothership fleet in the Bering Sea.

Most of the 14 fleets as of late September 1964 had terminated their operations. The motherships Tenyo Maru (11,581 gross tons), Seifu Maru (8,269 gross tons), Itsukushima Maru (5,871 gross tons), Taiyo Maru No. 82 (2,890 gross tons), and the Gyokuei Maru (10,357 gross tons) were en route to Japan. The Soyo Maru (11,192 gross tons) and the Hoyo Maru (14,094 gross tons) were scheduled to depart the fishing grounds by the end of September. Only the Chichibu Maru (7,420 gross tons), which is licensed to fish the year round, remained on the grounds. (Suisan Keizai Shimbun, September 25, 1964.)

* * * * *

STERN TRAWLERS TO FISH IN BERING SEA:

A Japanese fishing company (affiliated with a larger fishing company) planned to dispatch the 2,900-ton stern trawler Taiyo Maru No. 82 to the Bering Sea on November 1, 1964. The stern trawler (accompanied by one small trawler) was scheduled to operate between Umnak Island and Unimak Island until the end of December.

Another firm's newly constructed 3,500-ton stern trawler Aso Maru (accompanied by one 300-ton trawler) was scheduled to depart from Tobata for the Bering Sea on October 11. That trawler is equipped with canning and shrimp peeling equipment. (Suisancho Nippo, September 10; Minato Shimbun, September 9, 1964.)

* * * * * *

BERING SEA FISH MEAL PRODUCTION, 1964:

The four Japanese factoryships which engaged in fish-meal operations in the Eastern Bering Sea in 1964 produced a combined total of 49,430 metric tons of meal, exceeding their original combined target by about 4,000 metric tons. They primarily used Alaska pollock (80 percent of raw material utilized) for meal.

Typical fishing logbook of the mothership Gyokuei Maru.

Production by fleets was as follows: Gyokuei Maru (10,357 gross tons)--16,000 metric tons; Hoyo Maru (14,094 gross tons)--14,930 tons; Tenyo Maru (11,581 gross tons)--11,500 tons; and Soyo Maru (11,192 gross tons)--7,000 tons. (Suisan Tsushin, October 13, 1964.)

* * * * *

FIRM WITHDRAWS TRAWLER FACTORYSHIP FROM NORTHWEST ATLANTIC:

A large Japanese fishing company has withdrawn from the Northwest Atlantic the 3,500-ton trawler-factoryship Tenyo Maru No. 3. The trawler-factoryship (accompanied by two 300-ton trawlers) operated in the Northwest Atlantic for about one year on an experimental basis, but the owners have reached the conclusion that factoryship-type trawl operations are unsuitable for that area. The Tenyo Maru terminated operations on October 20, 1964, and was scheduled to arrive in Japan around mid-December. The owners are exploring the possibility of operating several 350- to 500-ton trawlers in that region from a fishing base in Newfoundland, Canada.

Japan (Contd.):

A second Japanese fishing firm (which operated the stern trawler Aoi Maru, 1,386 gross tons, on an experimental basis for approximately two years) withdrew its vessel at the end of July 1964, due to losses suffered from that venture. The trawler was sold to Greece and will operate in the waters off West Africa out of Las Palmas, Canary Islands. (Suisan Tsushin, October 20, 1964.)

* * * * *

NEW STERN TRAWLER FOR AFRICAN WATERS:

A new stern trawler, the Oshika Maru (3,000 gross tons), was completed by a Japanese shipyard and delivered to the Ojika Fishermen's Production Association in Japan which plans to operate the vessel in African waters.

The vessel has an extensive automation and remote control system for her main propulsion and auxiliary machinery and is Diesel-powered for a maximum of 3,500 b. hp. Trial runs of the vessel registered 15.94 knots per hour. The stern-engine design of the vessel was chosen because of certain operational advantages, such as torsional vibration of the shaft, and also because of the fish hold capacity, and capacity of water and petroleum tanks, as well as drafts at stern and bow of the vessel.

The vessel's main dimensions are: length between perpendiculars 285 feet 4 inches; moulded breadth 48 feet 9 inches; moulded depth 23 feet 5 inches; draft (designed full load) 19 feet 7 inches. The wheelhouse has a 360° field of vision which not only enables the men on the bridge to exercise concentrated supervision of fishing operations but also makes possible the observation of its trawl winch operated from a command position astern.

The vessel is equipped with radar and latest type fish finder, has a loran receiver, and various navigational instruments for safe and efficient vessel operation. Fish holds and processing facilities are located between decks starting from the vessel's stern--fish processing plant, cold-storage and freezer room, lobby and fish holds, in that order. Living accommodations for the crew are in the forward area of the upper deck. (Newsletter of Mitsubishi Heavy Industries, Ltd.)

* * * * *

USE OF OKINAWANS ON TRAWLERS UNDER STUDY:

The Nihon Isei Sokobikiami Kyokai (East China Sea Trawl Operators Association of Japan) is exploring the possibility of employing Okinawan fishermen to sail on the vessels operated by members of the Association. Reportedly, the East China Sea trawl operators, like vessel owners engaged in other fisheries in Japan, are experiencing great difficulty attracting young men into the fishery.

The shortage of fishing labor force in Japan is becoming acute. Young people, attracted by the land-based industries, are not interested in engaging in fishing. Those that engage in fisheries prefer to be connected with the large fishing companies.

To alleviate the fishing labor force shortage, consideration at one time was given to the possible employment of South Koreans. The idea was not feasible due to existing political, legal, and social relations between South Korea and Japan.

A study made by a member of the Trawl Operators Association on the Okinawan fishing labor force indicated that the Okinawan fisheries are also faced with a labor shortage but the shortage is nowhere near as acute as that in Japan. The study showed that working conditions and facilities on Japanese vessels are superior to those on Okinawan vessels. Also, the living standard of Japanese fishermen is higher. For example, the average income of a Japanese fisherman sailing on a trawler operating in the East China Sea amounts to 50,000 yen (US$139) a month as compared to an Okinawan trawl fisherman's monthly average income of 30,000 ($83). Furthermore, the Okinawans are not only good fisherman but have close political and social ties with Japan. For those reasons, the Association feels the idea of employing Okinawan fishermen has much merit and plans to study the matter carefully. (Suisan Keizai Shimbun, October 22, 1964, and other sources.)

* * * * *

ALUMINUM FISH HOLD FOR FISHING VESSEL:

The leading Japanese aluminum manufacturer has been awarded a contract to construct an aluminized fish hold for the Chiba Prefectural Government's tuna fishery guidance ves- Boso Maru (500 gross tons). Extensive tests conducted by the manufacturer have shown aluminum to be absolutely safe for use in con-

Japan (Contd.):

structing fish holds. Advantages cited are the lightness of the metal, better fish-holding quality, and improved sanitation. (Suisan Keizai Shimbun, October 20, 1964.)

* * * * *

JAPAN EXTERNAL TRADE PROMOTION ORGANIZATION ASSIGNS AGENT IN AMERICAN SAMOA:

JETRO (Japan External Trade Promotion Organization) has assigned an agent in American Samoa for the first time. The new agent, JETRO's former agent at Long Beach, was scheduled to leave for Samoa in October 1964.

The Japanese Government and the Japan Frozen Foods Inspection Corporation are sharing expenses equally for the maintenance of JETRO's office in Samoa. (Suisan Keizai Shimbun, October 9, 1964.)

* * * * *

CANNED SHRIMP EXPORTS TO GREAT BRITAIN:

Two of Japan's major fishing companies, which operate shrimp factoryships in the Eastern Bering Sea, are reported to be developing plans to increase their exports of canned shrimp to Great Britain.

Japanese 1963 exports of canned shrimp to Great Britain totaled 71,000 cases and to the United States 390,000 cases. In 1964 exports to Great Britain are expected to total over 100,000 cases, while exports to the United States are expected to decline by 130,000 cases. (Suisan Keizai Shimbun, October 7, 1964.)

* * * * *

FIRM EXPERIMENTING WITH CANNED HAKE:

A Japanese fishing company has been experimenting with canning merluza (hake) caught by its trawlers operating off South Africa. The firm was reported to have settled on one product--hake packed in oil. That firm was conducting taste tests and planned to to market that product in Japan in the fall of 1964. (Suisancho Nippo, September 18, 1964.)

* * * * *

COUNCIL FORMED OF JAPANESE LONG-LINE SEA BREAM FISHERY OPERATORS OFF NEW ZEALAND:

Of the 22 Japanese fishing firms engaged in long-line fishing for sea bream off New Zealand, 14 formed (on October 12, 1964) an organization called the "Council of Longline Fishery Operators Engaged in New Zealand Offshore Sea Bream Fishery." The objectives of that organization are to: (1) eliminate violations of New Zealand territorial waters by Japanese long-line operators; and (2) promote unity and cooperation among the fishery operators in achieving a balance between catch effort and availability, in order to stabilize the fishery and to conserve the resources.

The New Zealand offshore long-line sea bream fishery was first developed by one Japanese fishing company in the summer of 1963. Later, an increasing number of Japanese vessels began to converge on that fishing ground and violations of New Zealand territorial waters by Japanese fishing vessels also began to mount. This resulted in protests being lodged with Japan by that country. In view of the frequency of such infractions, the Japanese Fisheries Agency was planning on sending the vessel Toko Maru to the New Zealand waters in mid-October to patrol Japanese fishing activities. (Suisan Tsushin, October 14; Nihon Suisan Shimbun, October 14; and other sources.)

* * * * *

VIEWS ON 43RD FAO COUNCIL:

The 43rd Food and Agriculture Organization (FAO) Council, scheduled to convene in Rome, October 5, 1964, had 27 items on the agenda. Two related to fisheries: (1) the strengthening of the FAO Fisheries Division, and (2) the rational utilization of Atlantic tuna resources.

On September 25, Japan's Fisheries Agency firmed its position on those two agenda items. The Agency planned to support the proposal to strengthen the FAO Fisheries Division, but held that the formation of an international research organization (like the Inter-American Tropical Tuna Commission) as proposed by the United States is not necessary. Instead, the Japanese feel that each concerned country should conduct investigations on its own through an exchange of data, and the establishment of some form of organization connected with that type of research would not be positively op-

Japan (Contd.):

posed by Japan. (Suisan Keizai Shimbun, September 26, 1964.)

* * * * *

FISHING COMPANY EXECUTIVE EXPECTED TO VISIT MEXICO:

The Vice President of a large Japanese fishing firm was scheduled to depart for Mexico in late October 1964 to discuss with Mexican interests the establishment of a joint fishery enterprise in that country. The Japanese firm hopes to establish a joint whaling venture in Mexico and expand its operations to shrimp fishing in the future. (Shin Suisan Shimbun Sokuho, September 25, 1964.)

Republic of Korea

FISHERIES TRENDS, THIRD QUARTER 1964:

Japanese-Korean Fisheries Talks: In early August 1964, the Japanese Foreign Minister and the Korean Ambassador to Japan met to discuss the resumption of fisheries talks between the two countries. After their meeting, it was reported that the Minister and the Ambassador had agreed to resume the fisheries talks in Tokyo in September 1964. The Japanese Minister is also reported to have said that the Japanese Government would try to expedite economic assistance to Korea and to increase imports of farm and fishery products from Korea in order to help balance trade between the two countries. (The Korea Times, August 7, 1964.)

Typical trawler now fishing for Korea, but that country is now expanding its fleet to larger vessels.

(Editor's Note: Early in 1964, it appeared that normal relations between the two countries might be resumed this year if agreement could be reached on fisheries conservation regions, areas for Korea's exclusive fishing, and the amount and type of fisheries cooperation loans that Japan would provide. The talks on fisheries problems were suspended in the spring of 1964 before final agreement was reached.

The Japanese are reported to object to the Korean prohibition of Japanese fishing inside the "Peace Line," which extends at some points as much as 80 miles from Korea's shores. The Japanese have proposed substituting an exclusive Korean fishing zone extending not more than 12 nautical miles from shore. Negotiations have also focused on details regarding the delineation and establishment of a fisheries conservation zone in which fishing would be jointly restricted. Other practices under discussion when the negotiations were suspended in the spring included the type of equipment and number of vessels to be allowed in those conservation areas.

Normal relations with Japan could have an important effect on Korea's fishing industry. Japanese technical and economic assistance could help modernize the Korean fishing industry and increased Japanese imports from Korea could sharply expand Korean fishery shipments.

Shrimp Farming: A total of 800,000 white shrimp were reared by a Korean shrimp farm near Taechon (on the west coast) in its first attempt at cultivation of shrimp. In mid-1964, it was reported that the artificially-reared white shrimp would reach a size of 6 inches by September 1964 when they would be sold to Japan. The shrimp farm expects to expand its rearing area from 16 acres to 62 acres. (The Korea Times, July 17, 1964.)

Oceanography: The Korean Hydrographic Office has decided to participate in an international program of research on the Kuroshio Current, which is one of the main arteries in the circulation of the Pacific Ocean. It moves warm water from the Equator northward past Formosa and Japan and thence eastward across to the American coast, performing functions similar to those of the Gulf Stream in the Atlantic.

Korean officials said that since the warm current houses large quantities of fish, scientific research is needed to assist the fishing industry. They said that the nations interested

Republic of Korea (Contd.):

in the planned 4-year study of the Kuroshio Current are China, Hong Kong, Japan, Korea, the Philippines, United States, U.S.S.R., and Vietnam. (The Korea Times, August 7, 1964.)

* * * * *

VESSEL SPECIFICATIONS OF FISHING FLEET ORDERED FROM FRANCE:

A fleet of fishing vessels is to built by an Italian-French consortium for the Korea Marine Industry Development Corporation under a contract signed January 21, 1963, and amended December 11, 1963, and February 3, 1964.

Under the amended contract, the French members of the consortium will build 76 vessels for Korea, including 10 side trawlers of 130 gross registered tons (g.r.t.); 61 tuna long-line vessels of 140 g.r.t.; 2 stern trawlers of 200 g.r.t.; 2 stern trawlers of 1,300 g.r.t.; and a research and training vessel of 300 g.r.t.

The 10 side trawlers will be built at Bordeaux. Half of them will have gallows on the port side and the other half will have gallows on the starboard side to enable them to trawl in pairs. Each side trawler will have the following main dimensions: length overall 89.2 feet, breadth (molded) 20.7 feet, and depth (molded) 11.8 feet. Each side trawler will have a fish-hold capacity of 4,062 cubic feet, and each will be equipped with a main Diesel engine developing 460 b. horsepower.

The order for 61 tuna long-line vessels from France is shared by shipyards at Bordeaux (16 vessels), Le Havre (26 vessels), La Rochelle (11 vessels), Nantes (4 vessels), and Dieppe (4 vessels). Delivery will be spread between February 1965 and October 1966.

The tuna vessels will have the following main dimensions: length overall 98.4 feet, breadth (molded) 21.3 feet, depth (molded) 10.2 feet, and fish-hold capacity 4,238 cubic feet (the fish will be stored on ice). Each of the vessels will be equipped with a 460-b. horsepower Diesel engine.

The two 200-ton stern trawlers will be built by a shipyard at Dieppe for delivery in April and July 1966, and will have the following main dimensions: length overall 105 feet, breadth (molded) 23.7 feet, depth (molded) 12.4 feet, and fish-hold capacity 4,769 cubic feet (fish will be preserved on ice). Each of the vessels will be equipped with a 640-b. horsepower Diesel engine.

The two 1,300-ton stern trawlers will be built at Nantes and delivered in December 1965 and March 1966. Both vessels will have freezing facilities and each will have a length overall of 253.7 feet. Other dimensions will be: length between perpendiculars 217.2 feet, breadth (molded) 37.1 feet, depth to main deck 17.4 feet, depth to upper deck 25.3 feet, and loaded displacement 1,946 tons. the frozen fish hold of each vessel will have a capacity of 31,784 cubic feet. A Diesel engine developing 2,500 horsepower will give each vessel a speed of about 14 knots.

The 300-ton research and training vessel is to be built at Dieppe and will be delivered in September 1966. It will be designed for stern trawling and oceanographic research work. It will have an overall length of 123.4 feet, breadth (molded) 26.2 feet, depth (molded) 12.4 feet, and a frozen fish-hold capacity of 636 cubic feet. It will be powered by 2 Diesel engines developing a total of 928 horsepower to give the vessel a service speed of 11.5 knots. It will have accommodations for 5 scientists and 24 trainees, in addition to a normal crew. (World Fishing, September 1964.)

(Editor's Note: According to previous reports, the contract price for the vessels being built in France for Korea is about $18.7 million--not including engines. Marine motors and certain other equipment for the 76 vessels are to be supplied by an Italian group. In addition, the Italian group is to build and outfit a separate fleet of 15 vessels for Korea. The total price of the Italian vessels and supplies amounts to about $17.1 million, bringing the total Korean obligation under the contract with the Italian-French consortium to $35.8 million.)

Note: See Commercial Fisheries Review, April 1964 p. 62; November 1964 p. 98.

Mexico

VESSELS LEAVE MAZATLAN TO OPEN SHRIMP FISHING SEASON:

Some 260 shrimp fishing vessels left the port of Mazatlan on Mexico's west coast Sep-

Mexico (Contd.):

tember 23, 1964, for the new shrimp fishing season. About 60 vessels were unable to leave because they were in need of repairs. Early radio reports from the fleet were pessimistic indicating shrimp catches were smaller than anticipated.

Shrimp fleet at Mazatlan.

The disagreement between Mexican vessel owners and fishermen's cooperatives had not been resolved as of early October. It was reported that one vessel owner planned to send another six vessels to French Guiana in October. (Fisheries Attache, United States Embassy, Mexico, D. F., October 5, 1964.)

* * * * *

CONSTRUCTION OF NEW FISH CANNERY TO BE FINANCED BY SPANISH BUSINESSMEN:

A group of Spanish businessmen will invest about US$670,000 in the construction of a new fish canning plant at Ensenada, Baja California, Mexico. The announcement was made by the Banco de Comercio, Mexico City. (The Fishing News, September 18, 1964.)

* * * * *

USE OF MANATEE TO CONTROL AQUATIC WEEDS IN LAKES:

An experiment in Mexico to overcome the aquatic weed problem at several lakes infested with water hyacinth was started in May 1963. Because of the possible usefulness of manatee (sea cows) in controlling aquatic weeds, the Mexican Government introduced five of them into Lake Chapala, Mexico's largest lake. (Manatee are completely vegetarian and eat great quantities of weeds.) The project was initiated by Mexico's Fisheries Bureau of the Secretariat of Industry and Commerce in cooperation with the State of Jalisco and the Commission for the Promotion of Lake Chapala.

One of the manatee was killed shortly after being placed in the lake, but the other 4 were reported to be thriving, according to a September 1964 report. Fishermen frequently encounter the manatee and occasionally take them in their nets. One of the manatees was known to be ready to give birth when placed in the lake, and fishermen later reported catching and releasing a young one a little over 3 feet long, which is the size at birth.

The manatee in Lake Chapala appeared to be feeding on aquatic plants, it was reported, but because the fishermen had cleared most of the hyacinths mechanically, the animals turned to other varieties of plant pests and are expected to switch to hyacinths when that plant again becomes abundant. The cooperating agencies have posted signs explaining the program and requesting people not to molest the manatees.

The Mexican Fisheries Bureau considers the project to be experimental. The greatest environmental problem is the lower water temperature. The manatees came from the State of Tabasco which has water temperatures of 79° to 82° F. Lake Chapala's water temperature is 68° to 72° F. and is as low as 64° F. in winter. The cooler water may inhibit reproduction. Also, it has not been determined how many animals would be needed to keep the enormous plant population of Mexico's largest lake under control. (Fisheries Attache, United States Embassy, Mexico, D.F., October 2, 1964.)

Note: See Commercial Fisheries Review, October 1964 pp. 107 and 108.

Netherlands

MODERN FISH AUCTION FACILITY AT SCHEVENINGEN:

The construction of a new fish auction facility at Scheveningen (The Hague) on the North Sea, Netherlands, at the northwest side of Scheveningen's first inner harbor, was started in September 1961. Measuring 262 x 1,312 feet, the complex will be the biggest and most modern fish auction facility in Europe, comprising the auction hall itself, a

Netherlands (Contd.):

service and administration building, and behind it, a rear site that can be used for storage.

The establishment of the fish auction system in the Netherlands, and the compulsory sale of fish by auction, are designed as protective measures for the benefit of the fishing industry. All dealers must be officially registered before being admitted to the auction. By the auction system, fishermen can count on a fair price for their catch depending on supply, demand, and quality, and the dealers are guaranteed an adequate supply of fish.

The new fish auction hall along the first harbor at Scheveningen.

The auction hall is some 800 feet long, 85 feet wide, about 30 feet high, and can accommodate 10 modern trawlers moored alongside at one time, or space for 15 trawlers if moored alongside each other. The hall has a gross area capacity of nearly 75,000 square feet where 18,000 fish boxes can be placed. The service and administration building adjoins the auction hall's southwest side and contains several service rooms, the office of the Fish Auction Foundation, and the main offices of the Port and Market Authority. It also has a herring auction room that can accommodate 200 persons, and a large canteen for auction hall employees and visitors.

The roof of the building consists of 23 glass sections, each section measuring 46 x 85 feet placed in a slanting position and giving the impression of giant windows which are designed to diffuse from the northeast thus deflecting any heat caused by the sunlight. The total construction cost of the building is about $2.4 million.

All fish landed by fishermen at Dutch ports must be sold by auction whether catches are large or small, and buyers are obliged to buy fish only at the auctions. Thus, the fish auction site is considered a meeting place where fishermen, fishing vessel owners, and both the wholesale and retail trade meet almost every day--at a fixed location where the daily fish landings are sold by an impartial organization. In the Netherlands, both the wholesalers and retailers are permitted to attend fresh fish auctions, but only the wholesale trade is admitted to the salted herring auctions.

In the Netherlands there is one State-owned fish auction facility at IJmuiden, north of Amsterdam. In addition there are many municipal and a few privately owned auctions, some of which are operated on a cooperative basis. In Scheveningen the auction is managed by what is known as the Fish Auction Foundation in which both the fish trade and municipal authorities have representation. Fresh fish, including fresh herring, auctioned there is sold by "word of mouth," which means that the auctioneer presides orally over the fish auction activities. Salted herring, however, are auctioned by using an electric push-button system and the stopping of a turning hand at a price indicator.

Before Scheveningen had a harbor of its own, the fish catches were sold on the beach. After the first harbor was dug in 1904, the fish were auctioned at the docks along the only inner harbor existing at the time. In later years, an auction hall for salted herring was built along that harbor. After the second harbor was dug in the 1930's, the auction site for fresh fish was established about 1935 in a hall opposite the slipway along the second inner harbor. Later, that auction hall proved to be totally inadequate because of the cramped facilities and small waterfront, especially after World War II when fish landings were greater and large trawlers were being used.

Netherlands (Contd.):

In 1963, a total of 35,000 metric tons of fresh fish (including herring) valued at 18.2 million guilders (US$5.1 million) was landed at the Port of Scheveningen. In addition, the Port also handled 36,000 tons of salted herring that year valued at 16.8 million guilders ($4.7 million).

Note: See Commercial Fisheries Review, March 1964 p. 38.

Norway

WINTER HERRING FISHERY, 1964:

Catch: The 1964 Norwegian fishery for winter herring (which includes spring herring) yielded a catch of about 3.1 million hectoliters or 288,300 metric tons (including 1.3 million hectoliters or 120,900 tons of winter herring and 1.8 million hectoliters or 167,400 tons of spring herring). That was the best result in the fishery since 1960 when 3.2 million hectoliters (297,600 tons) were taken. The comparable catch in 1963 totaled only 661,000 hectoliters (61,473 tons). In 1964, purse-seiners accounted for an unusually high percentage of the winter herring landings with a catch of 2.5 million hectoliters (232,500 tons). Trawlers and drift-netters accounted for most of the remainder.

Utilization: About 2.5 million hectoliters (232,500 tons) of the Norwegian winter herring catch was processed into fish meal and oil; 228,089 hectoliters (21,212 tons) were frozen for export; 186,490 hectoliters (17,344 tons) were salted; 72,344 hectoliters (6,728 tons) were canned; 49,411 hectoliters (4,595 tons) were iced for export; 26,872 hectoliters (2,499 tons) were used for bait; and 17,709 hectoliters (1,647 tons) were absorbed by the Norwegian domestic fresh market.

Purse-seining for herring on fishing grounds off west coast of Norway.

Norway (Contd.):

Prices: The 1964 winter herring catch yielded fishermen about 69.8 million kroner (US$9.8 million) including state subsidies. The catch was about equally divided between the northern and southern fishing districts, but the northern catch brought considerably lower prices. The prices for northern winter and spring herring were fixed, respectively, at 20.0 and 17.5 kroner per hectoliter (US$1.36 and 1.19 per hundred pounds). That was 26 to 30 percent less than the prices paid for similar herring from the southern fishing districts. Fishermen were disappointed by the price differential. They were also said to be dissatisfied with the high proportion of the catch that went for meal and oil. The newspaper Harstad Tidende has indicated that Feitsildfiskernes Salslag (sales organization of the fat herring fishermen) may be named as the new sales agent for herring caught in the northern area.

Capelin Fishery: In 1964, ex-vessel capelin prices were relatively high; capelin yielded fishermen 16.85 kroner per hectoliter ($1.15 per hundred pounds) before March 15, and 12.61 kroner per hectoliter ($0.86 per hundred pounds) after that date--including the subsidy of 3.75 kroner per hectoliter ($0.21 per hundred pounds). The capelin fishery in the winter of 1964 yielded a catch of 53,395 hectoliters (4,966 tons) before March 15, and 148,387 hectoliters (13,800 tons) after that date. (Fiskaren, July 1, 1964.)

Note: Norwegian kroner 7.16 equal US$1.00.

* * * * *

AGREEMENT ON FISHING FOR DOGFISH AND BASKING SHARK SIGNED WITH GREAT BRITAIN:

A new agreement which permits Norwegian fishermen to fish for dogfish (*Acantis vulgaris*) and basking shark (*Cethorinus maximus*) in the waters surrounding northern Scotland and the Shetlands was signed by Norway and Great Britain on September 28, 1964, in London. Norwegians will have the right to fish within the new 12-mile limit around Great Britain until 1984, but will be excluded from fishing closer than 6 miles from shore after 1965. That region is to be reserved exclusively to Britons.

The right to fish for dogfish and basking shark in British coastal waters has traditionally been an important one for Norway. The new agreement reportedly will insure for Norwegian fishermen an estimated combined income of 250 million kroner (US$35.0 million) over the 20-year period. It will provide productive employment to Norwegian fishermen who might otherwise be idle after the great schools of cod and herring, which usually inhabit the waters around Norway from January to March, have departed. (United States Embassy, Oslo, October 4, 1964.)

Note: See Commercial Fisheries Review, September 1964 p. 88.

Persian Gulf

COMMERCIAL FISHERY IN SOUTHERN AREA TO BE DEVELOPED BY BRITISH FIRM:

Commercial fishing along a section of the Trucial Coast (the southern area of the Persian Gulf) is to be developed by a British fishing company of Grimsby in collaboration with interests at Beirut, Lebanon. The Trucial Coast (consisting of 7 sheikdoms) is a 350-mile coastal strip on the Arabian peninsula in the southwestern part of the Persian Gulf. The Beirut interests obtained the fishing concession from the ruling sheik at Ash Shariqah.

Persian Gulf (Contd.):

It is believed that the waters along the Trucial Coast abound in shrimp as well as other edible fish species. If shrimp are found in quantity and the enterprise is successful, it is anticipated that a large portion of the shrimp catch will be marketed in the United States. In making the announcement, the British fishing company said it is acting as adviser on all aspects of the fishing operations and will also be responsible for marketing the entire catch.

The first trawler purchased for the new enterprise was reported en route to the Trucial Coast and was to start fishing about the end of September 1964. The vessel has facilities and equipment for processing and freezing the catch, and enough cold-storage space for a substantial quantity of frozen fish and shellfish.

Philippines

SHRIMP EXPORTS, 1963:

Total shrimp (mostly frozen) exports by the Philippines in 1963 were valued at ₱537,000 (US$138,000), with most of those exports going to the United States market. The value of shrimp exported to the United States in 1963 was $113,000. The remainder of the shrimp exports with a value of $25,000 went to Japan.

The Philippine shrimp export business is relatively new and there are not more than four firms which export shrimp either on a regular basis or as specific orders are received. It is reported that there is no known local association of shrimp firms in the Philippines. (United States Embassy, Manila, September 25, 1964.)

Poland

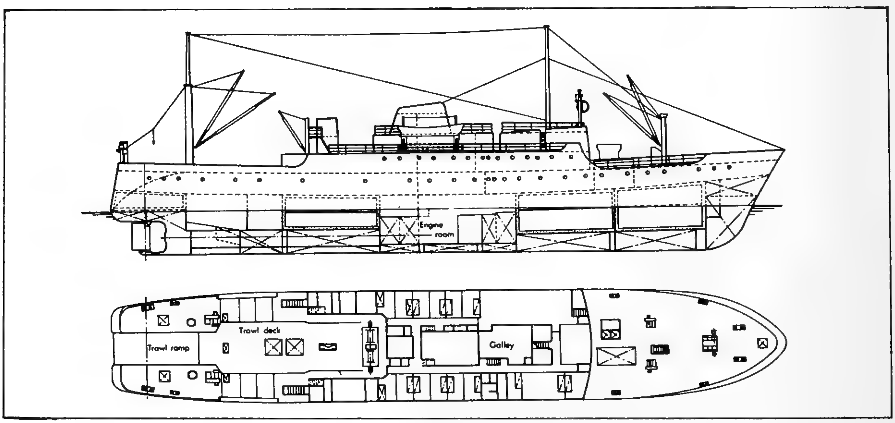
FISHERIES LANDINGS, JANUARY-JUNE 1964:

Polish landings of salt-water fish amounted to 112,708.4 metric tons in the first half

Polish Landings of Salt-Water Fish, January-June 1964[1]

Species	January-June 1964				Year 1963 Total
	State-Owned Enterprises	Cooperatives	Private Fishermen	Total	
	(Metric Tons)				
Salmon	0.3	85.1	44.1	129.5	331.3
Eel	-	10.3	57.7	68.0	154.5
Baltic herring	4,309.0	1,575.0	317.8	6,201.8	28,151.0
North Sea herring	21,273.6	-	-	21,273.6	73,275.8
Sprat	11,053.7	1,808.1	2,659.1	15,520.9	10,732.2
Cod	29,255.0	6,291.2	4,072.2	39,618.4	57,475.9
Flatfish	1,928.4	277.7	200.6	2,406.7	5,098.2
Mackerel	6,696.4	-	-	6,696.4	5,453.3
Ocean perch	11,388.2	-	-	11,388.2	13,023.2
Other salt-water fish[2]	8,063.6	26.7	215.0	8,305.3	13,532.7
Brackish-water fish	-	1,008.3	91.3	1,099.6	2,516.8
Total	93,968.2	11,082.4	7,657.8	112,708.4	209,744.9

1/Preliminary.
2/Includes catch off South Africa by state-owned enterprises.

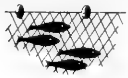


Profile and layout of modern Polish stem trawler.

Poland (Contd.):

of 1964. Cod was the leading species landed, followed by North Sea herring, sprat, and ocean perch. (Polish Maritime News, No. 73.)

Note: See Commercial Fisheries Review, June 1964 p. 56.



Portugal

CANNED FISH PACK, JANUARY-JUNE 1964:

Portugal's total pack of canned fish in oil or sauce in the first half of 1964 was up 146 percent from that in the same period in 1963. The increase was due mainly to a greatly expanded sardine pack. Portuguese sardine landings of 31,687 metric tons in January-June 1964 were up only slightly from the 30,262 metric tons landed in the first half of 1963, indicating the canneries received a larger percentage of the catch in 1964. (Conservas de Peixe, August 1964.)

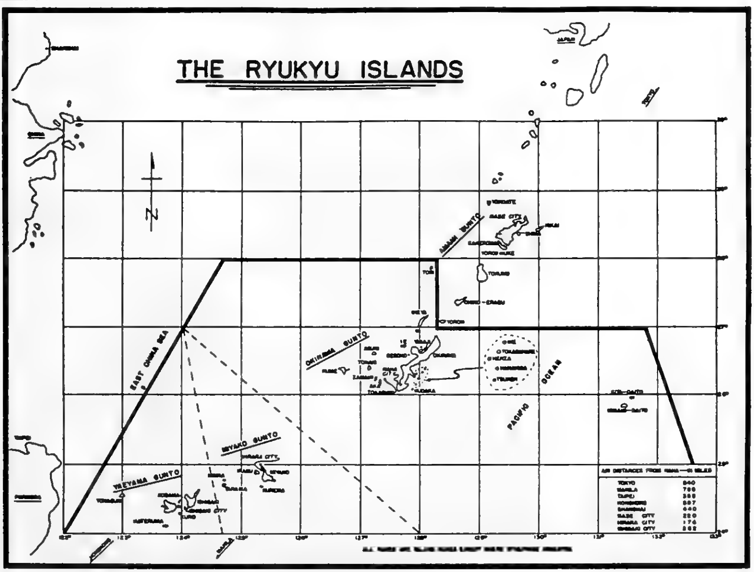
Portuguese Canned Fish Pack, January-June 1963-64				
Product	Jan.-June 1964		Jan.-June 1963	
	Metric Tons	1,000 Cases	Metric Tons	1,000 Cases
In oil or sauce:				
Sardines	17,681	930	4,576	241
Chinchards	476	24	30	1
Mackerel	1,635	65	952	37
Tuna and tuna-like .	2,176	72	1,943	64
Anchovy fillets . . .	1,469	147	2,069	206
Others	357	19	85	4
Total	23,794	1,257	9,655	553

Ryukyu Islands

GOVERNMENT SEEKS CHANGES IN TUNA FISHERIES AGREEMENT WITH JAPAN:

The Economics Bureau, Government of Ryukyu, as of the latter part of September 1964, was studying revisions in the Japan-Ryukyu Agreement pertaining to the distant-water tuna fisheries. The Agreement, concluded in 1960, provided for the licensing of a total of 4,500 gross tons of tuna fishing vessels under Ryukyuan registry. The Ryukyuan Government is seeking at least a twofold increase in tuna vessel tonnage under a new agreement.

The Ryukyuan tuna fleet presently consists of 26 tuna vessels (operated by 13 firms) total-



Ryukyu Islands (Contd.):

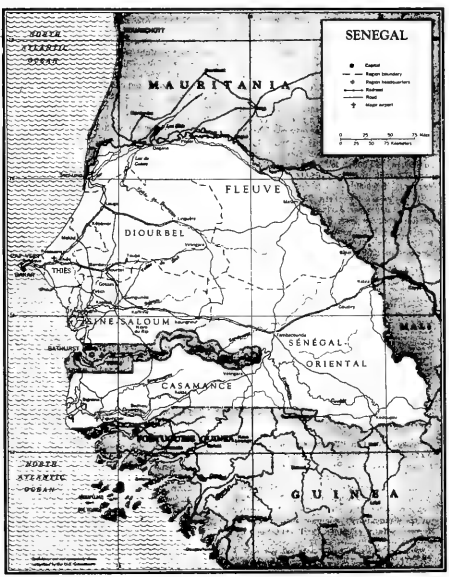
ing 5,564 gross tons. The fleet includes vessels totaling about 1,000 gross ton which were engaged in fishing prior to that Agreement and are therefore not covered by it. In 1963 the tuna fleet landed 17,538 metric tons of tuna and other species. (Suisan Keizai Shimbun, September 27, 1964.)

Senegal

SHRIMP FISHERY TRENDS, 1964:

Senegal's small but growing shrimp industry is expected to provide about 400 metric tons of shrimp for the French market in 1964.

The shrimp-processing plant at Ziguinchor in southern Senegal, which is controlled by French interests with headquarters in Dakar, started operating in May 1962 with a capital investment of $40,000 and a fleet of 50 artisan canoes (pirogues). Since that time, the working capital has been increased to $100,000 and the fleet of canoes has expanded to 300 craft.



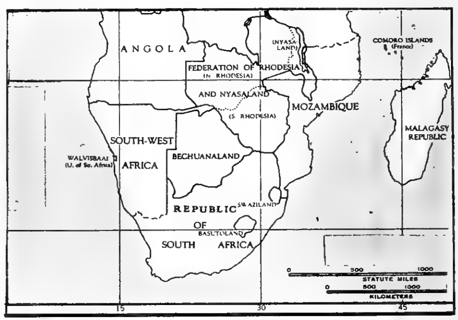
The six-months shrimp fishing season on the Casamance River is between May 15 and November 15. During that period, 150 fishermen are employed on a salary basis and 250 more fishermen employed under contract.

The French firm has recently expanded its plant facilities to include canning of oysters on an experimental basis. Canned oyster products include smoked oysters, oysters with chopped parsley and garlic, oysters with butter, and oysters in the natural form without any additives. The firm is reported interested in developing United States markets for those products. (Fisheries Attache, United States Embassy, Abidjan, September 16, 1964.)

South Africa Republic

PILCHARD-MAASBANKER FISHERY, MAY-JUNE 1964:

South Africa Republic: The shoal fish catch off the Cape west coast of South Africa Republic in June 1964 was 33,538 short tons pilchard, 549 tons maasbanker, and 6,345 tons anchovy, for a total of 40,432 tons. That compares with 77,966 tons pilchards and 322 tons maasbanker landed in June 1963.



The June 1964 catch yielded 9,904 short tons of fish meal, 600,605 imperial gallons of fish body oil, 2,582,592 pounds of canned pilchards, and 191,280 pounds of canned maasbanker.

The shoal fish catch off the Cape west coast of the South Africa Republic in May was 34,079 short tons pilchards, 2,006 tons maasbanker, 13,586 tons mackerel, 6,966 tons anchovy, and 2,218 tons herring, for a total of 58,855 tons. That compares with 61,012 tons pilchards and 4,787 tons maasbanker landed in May 1963.

South Africa Republic (Contd.):

(There were no mackerel, anchovy, or herring landings in May 1963.)

The May catch yielded 13,667 short tons of fish meal, 896,220 imperial gallons of fish body oil, 184,032 pounds of canned pilchards, 353,586 pounds of canned maasbanker, and 3,451,008 pounds of canned mackerel.

The Cape west coast shoal fish catch for the first 6 months of the 1964 season was 257,178 tons pilchards, 19,952 tons maasbanker, 55,319 tons mackerel, 16,947 tons anchovy, and 2,218 tons herring. The total catch was 351,614 tons. In the same period of 1963, the catch was 377,217 tons pilchards, 12,782 tons maasbanker and 14,634 tons mackerel. (There were no anchovy or herring landings in January-June 1963.)

South-West Africa: At Walvis Bay in South-West Africa, the pilchard catch amounted to 394,285 tons during January-June 1964.

The Walvis Bay pilchard industry has been taking full advantage of the higher oil yield of fish this season. In comparison with an average yield of 8 to 10 gallons per ton of fish last year, the fish oil yield this year has been averaging 25 to 28 gallons per ton of fish.

A few Walvis Bay factories expected to take their pilchard catch quota of 90,000 tons each by the end of August 1964; most of the others expect to take their catch quota by the end of October 1964.

An application by Walvis Bay pilchard processing factories for an increase of 60,000 tons in the 720,000-ton quota for 1964 has been refused by the South West Africa administration.

According to the Walvis Bay newspaper Namib Times, the industry made the application to enable it to meet additional market demands. The Administration, however, has said that the new anchovy fishery will provide additional supplies.

Each of the 7 factories at Walvis Bay has been allowed one anchovy purse-seine net, and there will be no restrictions imposed on the amount of anchovy which may be caught by the 7 vessels using those nets.

The new fish meal factory at Walvis Bay did not begin operating until mid-1964 and is not expected to attain its 90,000-ton pilchard quota until late in 1964. (The South African Shipping News and Fishing Industry Review, July and August 1964.)

South-West Africa

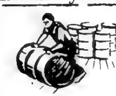
PILCHARD FISHING INDUSTRY TRENDS, FY 1963:

Heavy demand raised prices for South-West African fish meal in fiscal year 1963, according to the South West African Administration.

During the year ended March 31, 1964, a total of 600,000 short tons of pilchard was landed and processed at the 6 Walvis Bay factories of South-West Africa. That catch yielded about 150,000 tons of fish meal, which was sold for R11.4 million (US$16.0 million). The main market was the United Kingdom. The United States and Japan were also important buyers.

The total production of fish body oil from the 1963 pilchard catch was sold for R1.5 million ($2.1 million), entirely to the United Kingdom. (Editor's Note: Fish-body oil production from the 1963 pilchard catch was estimated at 4.5 million imperial gallons. The oil yield was below average.)

South-West African sales of canned pilchards in fiscal year 1963 amounted to R5.8 million ($8.1 million) as compared with sales of R12.1 million ($16.9 million) the previous fiscal year. The decline was due to price and demand fluctuations on the international market. (The South African Shipping News and Fishing Industry Review, July 1964.)



Spain

FISHERY TRENDS AT VIGO, JULY-SEPTEMBER 1964:

Landings and Prices: Fishery landings at the port of Vigo, Spain, in July-September 1964, while higher than the previous quarter (April-June) when they totaled 18,755 metric tons, were estimated to be about 20 percent lower than in the same period of 1963. The September 1964 landings of sardines are not included in the preliminary landings data for this quarter and the situation could change because sardine landings continued heavy into the early part of October. As of the end of September, the tuna (yellowfin) catch for the 1964 season was estimated to be about half that of the 1963 season, with ex-vessel prices higher than the previous year.

Spain (Contd.):

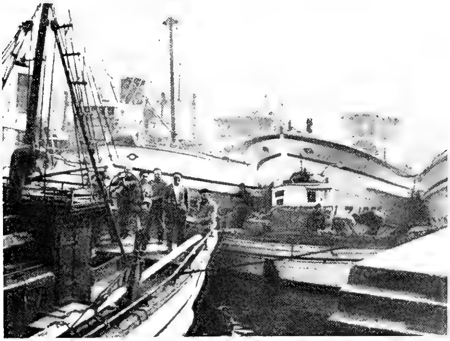


Fig. 1 - Wooden trawlers in Vigo's fishing port outfitted for tuna fishing. Long poles on left are used to drag lines alongside the vessel.

Canned Fish Industry: The canned fish industry worked at a much slower pace during the third quarter of 1964 than is normal during that time of the year. The poor catches of commercial varieties and the high prices at which offered contributed to that situation. Improvement was reported during the latter part of September and early October, and the reason for the recovery was a greater supply of fish, consisting mainly of sardines.

The recovery in canned fish exports reported for the second quarter of the year declined somewhat during the third quarter, with a decrease of about 15 percent both in quantity and in value. As compared with the third quarter of 1963, there was an increase of about 13 percent in quantity and of about 15 percent in value.

With the authorization on July 1, 1964, to export under certain conditions canned fish with peanut and other seed oils, fish canners expected that their sales abroad would increase. This apparently has not been the case, although the situation might improve in the near future as a result of that authorization. A further measure being sought by fish canners was an increase of the present 6 percent tax exemption on exports to levels ranging up to 17 percent. (United States Consulate, Vigo, October 16, 1964.)

Note: See Commercial Fisheries Review, October 1964 p. 78.

Taiwan

SHRIMP EXPORTS, JANUARY-JUNE 1964:

Five fishery firms in Taiwan exported a total of 360,526 pounds of shrimp valued at US$315,040 during the first six months of 1964. All of it went to Japan except for a very small quantity which was shipped to the United States. Two of the firms shipped about 125,000 pounds each during that period. Each of the other three firms shipped an average of about 40,000 pounds. One of the shrimp exporting companies is a United States firm established in Taiwan. (United States Embassy, Taipei, September 23, 1964.)

Fig. 2 - Spanish stern freezer trawler Villalba.

U.S.S.R.

STATE FISHERIES PRODUCTION COMMISSION RECOMMENDS DEEP-WATER TRAWLING FOR FISHING VESSELS:

The head of the fishing department of the Soviet State Fisheries Production Commission has recommended to all regional departments that they equip their vessels for deep-water trawling in 1964, according to a report in a

U.S.S.R. (Contd.):

Soviet periodical dated September 26, 1964. His recommendation was based on results obtained from studies conducted in the different sea areas on deep-dwelling species of fish and on the policy subsequently adopted by the Production Commission to develop a deep-water fishery. (Suisancho Nippo, September 10, 1964.)

United Kingdom

TWO NEW SEMIAUTOMATED STERN TRAWLERS OF "DARING" CLASS TO BE BUILT:

A shipyard at Selby, England, has orders to build two new stern trawlers along the revolutionary lines of the Ross Daring (launched May 1963) and her sistership Ross Delight (launched August 1963). Each of those semiautomated stern trawlers has a length overall of 99 feet, a range of about 30 days, and a fish-hold capacity for about 140,000 pounds of iced fish.

The semiautomated stern trawler Ross Daring.

The basic "Daring" design will be used by the Selby shipyard in building the two new stern trawlers. However, design information gained through extensive trials has been fed back to the shipyard and this, together with modifications made by the owners to the equipment on the trawlers in service, is being incorporated in the construction of the two new vessels. Work on the first of the new trawlers started in October 1964; it is scheduled for completion in April 1965.

The existing trawlers, Ross Daring and Ross Delight, are each worked by a crew of five men including the skipper. The automated design of the vessels provides an engineroom which operates unattended, requiring only periodic visits the whole time the trawler is at sea. Electronic controls for the machinery, and hydraulic controls for the winches enable each vessel to be handled, when trawling, by one man.

In 4 recent North Sea fishing trips totaling 32 days, the Ross Daring landed 826 kits (115,640 pounds) of fish which were sold at dockside for £5,699 (US$15,957).

Note: See Commercial Fisheries Review, September 1963 p. 92.

Yugoslavia

FISHERIES TRENDS, 1964:

Development Program, 1964-1970: The proposed fisheries development program in the Yugoslav 7-Year Economic Plan for 1964-1970 was approved by representatives of the country's fishing industry at a meeting at Fiume (Rijeka) early in 1964.

CATCH: The new 7-Year Economic Plan calls for the annual marine catch of Yugoslavia to increase sixfold over current levels and reach 120,000 metric tons by 1970, consisting of 80,000 tons from the ocean and 40,000 tons from the Adriatic Sea.

FISHING FLEET: The Plan also envisions a fishing fleet investment during 1964-1970 of approximately 53,000 million lire (US$85 million) to be used to build 160 vessels for Adriatic fishing, 40 for ocean fishing, and 6 for fish transport. An additional 2,000 million lire ($3 million) will be allocated to the lake and inland water fisheries of Yugoslavia. (La Pesca Italiana, April 1964.)

Tuna Fishing: In early 1964, a contract was announced between a shipyard and a fisheries firm in Yugoslavia for the construction of a series of large motor fishing vessels to be used for tuna fishing in the Atlantic. Those vessels, to be built at Pola (Pula), will be equipped to fish off the west coast of Africa; each vessel will have storage space for 450 tons of frozen fish. (ISEA, January 1964.)

Fish Meal: A Yugoslav fish-meal factory in Zadar began test production in mid-1964. Reports indicated the new factory would be

Yugoslavia (Contd.):

processing 20 tons of raw material daily by the end of September 1964. The annual production of the factory will be greater than that of all the other Yugoslav fish-meal factories combined. The new fish-meal factory is using raw materials that formally were thrown into the sea.

Four more fish-meal factories like the one at Zadar are planned. (Borba, Belgrade, September 18, 1964.)

Note: Italian lira 624.9 equal US$1.00.

SEA SCALLOPS--A YEAR-ROUND SHELLFISH FAVORITE

Sea scallops, considered as one of the tastiest foods from the deep, are plentiful and economical, and they are never out of season. The ocean variety of scallops is harvested and marketed year-around.

Scallops are active swimmers, moving freely through the waters of the sea. The active opening and closing of its shell, controlled by the adductor muscle, provides a form of water-jet locomotion for the scallop. The sweet, firm-meat adductor muscle, often called the "eye," is the part of the scallop which Americans so thoroughly enjoy.

The sea scallop is harvested from the deep waters off the North and Middle Atlantic States. The bulk of the catch of this delicious shellfish is landed at the old whaling port of New Bedford, Mass., which is known to many as "The Scallop Center of the World." The sea scallop shell is saucer-shaped and sometimes grows to a diameter of 8 inches.

Shoppers find that scallops as marketed are one of the best buys because they are 100 percent edible--no waste. Scallops are available in a variety of market forms including fresh, frozen, frozen breaded, frozen deep-fried, and in packaged frozen dinners. Scallop meats are lean, light, and firm; and contain the easily digested animal protein so necessary for body growth and repair. The scallop is also an excellent source of calcium, phosphorus, iron, copper, and iodine. It is characterized by an extremely low fat content.

The most familiar scallop main dishes are deep-fried or pan-fried. Scallops are also served in cocktails, appetizers, soups, casseroles, and salads with equally satisfying results. Delicious, never out of season, sea scallops provide delectable eating.

Home economists of the U.S. Bureau of Commercial Fisheries recommend the following recipe. Additional recipes are to be found in the recipe publication How to Cook Scallops. It is sold by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, for 25 cents a copy.

Scallops Amandine

2 pounds scallops, fresh or frozen	½ cup blanched slivered almonds
1 teaspoon salt	½ cup butter or margarine, melted
Dash pepper	2 tablespoons chopped parsley
½ cup flour	Toast points

Thaw frozen scallops. Rinse with cold water to remove any shell particles. Cut large scallops in half. Sprinkle scallops with salt and pepper. Roll in flour. Fry almonds in butter until lightly browned. Remove almonds. Add scallops and continue frying. When scallops are brown on one side, turn carefully and brown the other side. Cooking time approximately 4 to 6 minutes. Add parsley and almonds. Serve on toast points. Serves 6.

FEDERAL ACTIONS

Department of Health, Education, and Welfare

FOOD AND DRUG ADMINISTRATION

USE OF SODIUM NITRATE AND SODIUM NITRITE AS FOOD ADDITIVES IN SMOKED CURED SABLEFISH:

A request for permission to use sodium nitrate and sodium nitrite as preservatives and color fixatives in smoked cured sablefish is the subject of a petition to the U. S. Food and Drug Administration. Petition was filed by the Association of Smoked Fish Processors, Inc., New York City. Notice of the petition was published in the Federal Register, September 26, 1964.

The proposal is the issuance of amendments to sections of the Federal Food, Drug, and Cosmetic Act dealing with food additives to provide for the safe use of sodium nitrate and sodium nitrite as preservatives and color fixatives in smoked, cured sablefish, at levels not in excess of 0.05 percent sodium nitrate and 0.02 percent sodium nitrite in the finished product.

Note: See Commercial Fisheries Review, February 1962 p. 102.

* * * * *

ANNUAL CONFERENCE HIGHLIGHTS UNDERSTANDING OF U.S. PURE FOOD AND DRUG LAW:

The 8th Annual Conference, sponsored jointly by the Food and Drug Administration (FDA) of the U. S. Department of Health, Education, and Welfare and the Food Law Institute, was held on November 30, 1964. The purpose of the Conference was to promote understanding of and voluntary compliance with the Federal pure food and drug law.

Four food and drug workshop sessions scheduled for the meeting had as their theme "What Industry Needs from FDA for Better Compliance." A consumer panel had the theme "What the Public Wants in Consumer Education."

An innovation for the 8th Annual Conference was an exhibition of outstanding visual communications chosen by a special review committee from entries submitted by Government agencies and industry. They included outstanding motion pictures, filmstrips, and exhibits used to answer public interest in the integrity of foods, drugs, and cosmetics; to further good manufacturing and marketing practices, and to promote voluntary compliance.

The Conference featured a keynote address by Food and Drug Commissioner George P. Larrick, and a response from the president of the Food Law Institute. There were also addresses by other FDA officials and industry leaders.

The panel workshops were conducted by a moderator and 4 expert panelists--2 each from FDA and industry. In the food area, they included sections devoted to: (1) "Sanitation and Quality Control," moderated by the Director of FDA's Bureau of Scientific Standards and Evaluation; and (2) "Additives and Pesticides," moderated by an official of Atlas Chemical Industries. A workshop on consumer education was moderated by the Director of FDA's Division of Consumer Education. (Press release of U. S. Food and Drug Administration, Washington, D. C.)

Department of the Interior

FISH AND WILDLIFE SERVICE

DETERMINATION OF FISHERY FAILURE DUE TO RESOURCE DISASTER IN GREAT LAKES AREA:

In an announcement dated July 21, 1964, published in the July 25, 1964, Federal Regis-

ter, the Secretary of the Interior determined that the Great Lakes fishing industry, as well as processors and distributors of smoked fish from the Great Lakes, incurred substantial economic injury in October 1963 as a result of temporary loss of markets for smoked fish.

The Secretary stated that the circumstances constituted a commercial fishery failure due to a resource disaster within the meaning of section 4(b) of Public Law 88-309 (Commercial Fisheries Research and Development Act), and therefore, he authorized the use of funds appropriated under the new law to alleviate the serious situation in the Great Lakes area.

Public Law 88-309 was signed by the President on May 20, 1964. Section 4(b) of the new law provides that the Secretary of the Interior may make available up to $400,000 to aid a fishing industry when he determines that a commercial fishery failure due to a resource disaster has occurred.

The determination made by the Secretary of a commercial fishery failure due to a resource disaster in the Great Lakes area, as published in the Federal Register, July 25, 1964, follows:

DEPARTMENT OF THE INTERIOR

Office of the Secretary

GREAT LAKES AREA

Determination of Fishery Failure Due to Resource Disaster

Whereas, many firms are engaged in catching, processing and marketing fish from the Great Lakes area; and

Whereas, the Food and Drug Administration on October 25, 1963, issued a statement warning the public of botulism in smoked fish from the Great Lakes area; and this warning was followed by a drastic reduction in consumption resulting in substantial economic injury to the Great Lakes fishing industry and to processors and distributors of smoked fish from the Great Lakes area; and

Whereas, the cause of the botulism was not known; and

Whereas, Great Lakes chubs on hand at the time of this incident were either destroyed or preserved in freezers, with approximately 2 million pounds still in storage; and these fish, even though frozen, have deteriorated to the point where they cannot even be used for pet food; and the only use to which they can now be put is for reduction, that is, to produce fishmeal; and the value of the fishmeal will not pay for the processing and raw material transport costs;

Now, therefore, as Secretary of the Interior, I hereby determine that the foregoing circumstances constitute a commercial fishery failure due to a resource disaster within the meaning of section 4(b) of Public Law 88-309. Pursuant to this determination, I hereby authorize the use of funds appropriated under the above legislation as diversion payments to cause removal from the usual markets the stocks of chubs which are preventing normal trade operations and for such other measures as may be necessary to mitigate the damage.

STEWART L. UDALL,
Secretary of the Interior.

JULY 21, 1964.

Note: See Commercial Fisheries Review, Oct. 1964 pp. 25, 85; Sept. 1964 p. 100 Aug. 1964 p. 95.

* * * * *

REGULATIONS ON COMMERCIAL FISHERIES RESEARCH AND DEVELOPMENT ACT PUBLISHED:

Final regulations setting up procedures to be used by the Secretary of the Interior in giving financial aid to state agencies for research and development of the commercial fisheries resources of the Nation were published in the October 3, 1964, Federal Register. Regulations became effective on the date of publication. They bring into effect the Commercial Fisheries and Development Act of 1964 (Public Law 88-309) passed by Congress this year and signed by President Johnson May 20, 1964. First, the new law provides for payment of $5 million annually to states for commercial fishery research and development over a five-year period. The states will be required to provide matching funds equal to at least 25 percent of project costs. However, Congress adjourned this year before it was able to appropriate funds to implement this part of the new law.

Second, the Act also authorizes the allocation of $400,000 annually for two years and $650,000 for each of the following three years to states where there is a commercial fishery failure resulting from natural or undetermined causes (under Section 4(b)). For the fiscal year ending June 30, 1965, Congress did appropriate $400,000 for that part of the Act. The Secretary of the Interior has already taken action to assist the Great Lakes area fishing industry recover from economic losses suffered in 1963. In subsequent years, such funds will be available to other segments of the industry suffering fishery failures arising from economic disasters. Regulations applying to Section 4(b) were published in the August 27, 1964, Federal Register.)

Third, the law authorizes the allocation of $100,000 a year to states for developing new commercial fisheries. No funds are yet available for this part.

Fourth, it provides for loan funds to Alaska's fishermen for charter of fishing vessels for temporary replacement pending the repair or permanent replacement of vessels lost or damaged in the March 27, 1964, Alaska earthquake disaster. Repayment of those loans is to be made only from the net profits of the operation of the chartered vessels after deducting a reasonable amount for the salary of the fishermen chartering the vessels. (Regulations covering this provision of the Act were published in the May 23, 1964, Federal Register.

A Notice of Proposed Rule Making was published in the Federal Register of July 10, 1964. Interested persons were given 30 days in which to submit written comments, suggestions, or objections to the proposed new part. Comments on Section 253.4 of 50 CFR Part 253 dealing with "Use of resource disaster funds" were to be submitted at an earlier date.

Comments have been received for all other sections of Part 253. Consideration was given to such comments and appropriate clarifying changes have been made.

The regulations covered by Part 253 are published complete (to include those regulations issued for just part of the Act) in

the Federal Register, October 3, 1964. The regulations include definitions, interpretation of the authorization, use of research and development funds, use of new commercial fishery funds, financial responsibility, reporting, record retention, audit and inspection, patents and inventions, etc.

The regulations as they appeared in the Federal Register follow:

Title 50—WILDLIFE AND FISHERIES

Chapter II—Bureau of Commercial Fisheries, Fish and Wildlife Service, Department of the Interior

SUBCHAPTER F—AID TO FISHERIES

PART 253—COMMERCIAL FISHERIES RESEARCH AND DEVELOPMENT

On Pages 9454 through 9456 of the FEDERAL REGISTER of July 10, 1964, there was published a notice and text of a proposed new Part 253 of Title 50, Code of Federal Regulations. The purpose of the new part was to provide for procedures to be used by the Secretary of the Interior in providing financial assistance to State Agencies for research and development of the commercial fisheries resources of the Nation and, in cooperation with State Agencies, directly to the commercial fisheries in cases where he has determined that there is a commercial fishery failure due to a resource disaster arising from natural or undetermined causes, or where he may prevent such a resource disaster.

Interested persons were given 30 days in which to submit written comments, suggestions, or objections with respect to the proposed new part; except, that comments with respect to § 253.4 *Use of resource disaster funds*, were required to be submitted to the Director, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C., 20240, within a period of 10 days.

In paragraph (a) *Determination*, of § 253.4 *Use of resource disaster funds*, it was noted the Secretary shall cause to be published in the FEDERAL REGISTER a notice of finding that a commercial fishery failure due to a resource disaster arising from natural or undetermined causes when such a finding is made. After such publication, resource disaster funds may be used for specified purposes with the cooperation of the respective State Agencies.

The FEDERAL REGISTER of July 25, 1964, included a notice of determination by the Secretary of the Interior that a commercial fishery failure due to a resource disaster within the meaning of section 4(b) of Public Law 88-309 existed in the Great Lakes fishing industry.

On August 27, 1964, there was published in the FEDERAL REGISTER § 253.4 *Use of resource disaster funds*, as a formal regulation. Comments have now been received for all other sections of Part 253. Consideration has been given to such comments and appropriate clarifying changes made in §§ 253.1 to 253.12, inclusive. These sections are hereby added to § 253.4, which has already been published as a regulation, and Part 253 is now published in its entirety.

AUTHORITY: The provisions of this part 253 issued under sec. 8, Public Law 88-309.

§ 253.1 Definitions.

As used in this part, terms shall have the meaning ascribed in this section.

(a) *Secretary*. The Secretary of the Interior or his authorized representative.

(b) *Act*. Public Law 88-309, Commercial Fisheries Research and Development Act of 1964.

(c) *Research and development funds*. Funds, the appropriation of which, were authorized by subsection 4(a) of the Act.

(d) *Resource disaster funds*. Funds, the appropriation of which, were authorized by subsection 4(b) of the Act.

(e) *New commercial fishery funds*. Funds, the appropriation of which, were authorized by subsection 4(c) of the Act.

(f) *Person*. Individual, association, partnership or corporation, any one or all as the context requires.

(g) *Primary producer or commercial fisherman*. A person owning, having a beneficial interest in, managing, or operating a vessel or gear engaged in harvesting raw fish for commercial purposes.

(h) *Net profits*. The net profit, before taxes, as computed in accordance with generally accepted accounting standards with due regard to the practices in the locality in which the fishing operation is conducted.

(i) *Reasonable amount as determined by the Secretary for the salary of the fisherman*. A computed amount equal to the average income of the applicant from fishing operations during the 3 preceding calendar years, with a maximum of $3,000, computed from applicant's income tax returns for those years.

(j) *Contractor*. A person, agency or institution performing services, under contract with the State Agency, in carrying out the provisions of a project agreement.

(k) *Commercial fisheries resources*. Stocks of raw fish available or potentially available for harvesting with the primary intent of moving the product into channels of commercial trade.

§ 253.2 Interpretation of the authorization.

The terms used in the Act to describe the authorization to the Secretary are construed to be limited to the meanings ascribed in this section.

(a) Supplement, and, to the extent practicable, increase the amounts of State funds. The words "supplement, and, to the extent practicable, increase the amounts of State funds" mean that State funds, to be used for at least 25 percent of the cost of a project financed with research and development funds, will be additional funds provided for that project and will not represent funds diverted from some other commercial fishery project except that during fiscal years 1965 and 1966, the fact that a State Legislature did not meet after approval of this Act will be considered evidence that it is not practicable for the State Agency to furnish funds that have not been previously used for other commercial fishery projects.

(b) Resource disaster arising from natural or undetermined causes. The words "resource disaster arising from natural or undetermined causes" mean a serious disruption of a fishery caused by alteration of habitat affecting present and future productivity, inability to catch the raw fish, or inability to sell the catch, because of a natural or undetermined cause. It does not include inability to sell the catch because of competition from imported or other competitive products.

(c) Developing a new commercial fishery. The words "developing a new commercial fishery" mean the development of a fishery for species of fish not common to the commercial fishery in the State in which the development is anticipated, or on stocks of fish not then being utilized commercially.

(d) Manufactured or processed fishery merchandise. The words "manufactured or processed fishery merchandise" mean fishery products which are included in the tables entitled Manufactured Fishery Products appearing in the annual Bureau of Commercial Fisheries Statistical Digests, Fishery Statistics of the United States. Data on new products, or the collection of statistics on products not formerly covered in these tabulations, will only be included in the subsequent year's determination of the apportionments.

§ 253.3 Use of research and development funds.

(a) *Apportionment and obligation*. On July 1 of each year, or as soon thereafter as practicable, the Secretary shall certify to the respective State agencies and the Secretary of the Treasury the amount of the respective apportionments of funds appropriated pursuant to section 4(a) of the Act. The Governor of each State shall notify the Secretary which agency of the State government is the agency authorized under its laws to regulate commercial fisheries and a duly authorized official of the State shall certify as to the duly appointed official authorized in accordance with State law to commit the State to participation under the provision of the Act, to sign project documents, and to receive payments. Each interstate agency shall provide similar certification prior to participation in the program. The Secretary shall be advised promptly of any change made in such authorizations. No funds may be obligated until aforesaid certification has been received. Proposed projects may be submitted at any time after the apportionment is made, but must be submitted at least 120 days prior to the end of the fiscal year following the year in which the apportionment to be charged was made. Notice of obligation of the funds will be furnished the applicable State agency as soon as possible after approval of the project by the Secretary.

(b) *Preliminary project statement.* A preliminary project statement shall be submitted for each proposed project which shall contain such fundamental information as the Secretary may require, in order to determine if the project should be approved. The preliminary project statement shall include plans, specifications, duration, experimental design, personnel and cost estimates, as well as the source of funding.

(c) *Project agreement.* After the Secretary shall have approved a preliminary project statement, mutual obligations to be undertaken by the cooperating agencies shall be evidenced by a project agreement to be executed between the State agency and the Secretary for each such project.

(d) *Prosecution of work.* (1) The State Agency shall carry all approved projects through to a stage of completion acceptable to the Secretary with reasonable promptness. Failure to render satisfactory progress reports or failure to complete the project to the satisfaction of the Secretary shall be cause for the Secretary to withhold further payments until the project provisions are satisfactorily met. Projects may be terminated upon determination by the Secretary that satisfactory progress has not been maintained. The Secretary shall have the right to inspect and review work being done at any time.

(2) Research and/or development work shall be continuously coordinated by the State Agency with studies conducted by other State and non-State Agencies in order to avoid unnecessary duplication.

(3) All work shall be performed in accordance with applicable State laws, except when contradictory to Federal laws or regulations, in which case Federal law or regulations will prevail.

(e) *Economy and efficiency.* No project shall be approved until the State has shown to the satisfaction of the Secretary that appropriate and adequate means shall be employed to achieve economy and efficiency in the completion of the project.

(f) *Contracts.* Supply, service, equipment and construction contracts involving an expenditure of $2,500 or more entered into by a State Agency for the execution of approved project activities shall be based upon free and open competitive bids. If a contract is awarded to other than the lowest responsible bidder, the payment of the Federal portion of the cost of the project shall be based on the lowest responsible bid, unless it is satisfactorily shown that it was advantageous to the project to accept a higher bid. Upon request, the State Agency shall certify and promptly furnish to the Secretary a copy of each contract executed and copies of all bids received concerning the contract.

(g) *Form of vouchers.* Vouchers on forms provided by the Secretary and certified as therein prescribed, showing amounts expended on each project and the Federal portion claimed to be due on account thereof shall be submitted to the Secretary by the State Agency either after completion of each project or as the work progresses.

(h) *Safety and accident prevention.* In the performance of each project, the State shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation. The State shall be responsible that all safeguards, safety devices, and protective equipment are provided and will take other needed actions reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of work on the project.

(i) *Personnel.* The State agency or the contractor shall maintain an adequate and competent force of employees to initiate and carry approved projects through to satisfactory completion. Personnel employed on approved projects by the State Agency shall be selected on the basis of their competence to perform the services required and shall conduct their duties in a manner acceptable to the Secretary.

(j) *Nondiscrimination.* Each project agreement shall contain the applicable sections of Executive Order No. 10925, dated March 6, 1961, as amended, pertaining to nondiscrimination and shall also be subject to Public Law 88-352 and any regulations promulgated thereunder.

§ 253.4 Use of resource disaster funds.

(a) *Determination.* The Secretary shall cause to be published in the FEDERAL REGISTER a notice of finding that a commercial fishery failure due to a resource disaster arising from natural or undetermined causes exists at the time such a finding is made. After such publication, resource disaster funds may be used for the following purposes with the cooperation of the respective State Agencies:

(1) Payments causing the removal from the usual markets of stocks of fish or shellfish of the species listed in the said finding which are preventing normal trade operations. No payments will be made under this paragraph unless the Secretary deems such action necessary to aid in restoring normal trade operations; the person receiving such payment, if not the primary producer, provides evidence that he has reimbursed the primary producer, or such other person from whom the raw fish was purchased; the person receiving such payments has furnished the Secretary with such information regarding purchases, costs, sales, etc., as the Secretary may require; and satisfactory evidence of removal of the products from channels of distribution, including storage, shall be provided to the Secretary. No payments may be made for any product which was removed from storage or other channels of distribution prior to the approval of this Act.

(2) Payments to primary producers of the species of fish listed in the said finding to assist them in obtaining gear or equipment necessary to operate in the same or a different fishery than that affected by the said resource disaster. No payments will be made under this paragraph unless the Secretary deems such action necessary to aid in restoring primary producers adversely affected by the said commercial fishery failure to a condition where they can operate profitably; the person receiving such payments furnishes the Secretary with such information regarding catches, sales and costs as the Secretary may require; and the person receiving such payments agrees to operate the gear purchased with the assistance of such payment in a manner satisfactory to the Secretary.

(3) Short-term loans for operating expenses of primary producers. When loans are made under this paragraph, the interest rate shall be 3 percent and repayment will be required only from net profits of the fishing operation, which net profit shall be reduced by such reasonable amount as determined by the Secretary for the salary of the fisherman. No such loans will be made unless the Secretary deems such action necessary to aid in restoring primary producers adversely affected by the said commercial fishery failure to a condition that will permit them to resume operations; the funds are not otherwise available on reasonable terms; and the past earning and credit record of the applicant is such that it provides reasonable assurance of repayment.

(4) Payments to State Agencies for projects directly related to the restoration of the fishery affected by the said resource disaster or to prevent a similar failure of the fishery in the future. Such preliminary project proposals and their processing will be subject to all regulations relating thereto in this Part, except that these projects will be given preference over other proposed projects with reference to the use of funds obtained under subsection 4(b) of the Act, and Federal funds may be used for 100 percent of the cost of the project if all of the funds are obtained from appropriations authorized under subsection 4(b) of the Act.

(b) *Non-determination.* At any time when there is no finding of a commercial fishery failure as described in subsection (a) of this section, the Secretary may, if he deems such action to be in furtherance of the purposes of the Act, approved preliminary project proposals for funding under subsection 4(b) of the Act from funds carried over from previous fiscal years; provided however, that no preliminary project proposal from any State will be funded under this subsection until that State has had all of its available apportioned funds, if any, obtained from appropriations authorized under subsection 4(a) of the Act, obligated.

§ 253.5 Use of new commercial fishery funds.

Preliminary project proposals leading to the establishment of a new commercial fishery may be approved for funding under this section when the Secretary finds that the proposal, if approved and carried out, will reasonably assure the establishment of a new commercial fishery within the State submitting the proposal. All proposals under this section will be subject to all applicable regulations of this Part, except that 100 percent of the project costs may be paid from Federal funds and, if the Secretary deems that the proposal will further the purposes of the Act, these proposals may be approved without the requirement that the State submitting the proposal first have obligated all of its apportioned funds, if any.

§ 253.6 Financial responsibility.

(a) State Agencies are required to account for each approved project. Cost accounting records, consistent with generally accepted accounting standards, shall be maintained for each project separately.

(b) State Agencies are responsible for the financial management of the project.

Appropriate internal controls will, therefore, be adopted and installed to insure that the project is accomplished in the most efficient and economical manner.

§ 253.7 **Reporting.**

(a) Quarterly progress reports on approved projects will be furnished by State Agencies. These reports will be compiled on forms approved by the Secretary. Progress payments or other disbursements will not be made unless reporting requirements are met.

(b) Completion reports, on forms approved by the Secretary, are required when the project is completed pursuant to the project agreement. Final progress payments to State Agencies on individual projects will not be made until a completion report has been rendered and accepted by the Secretary. Completion reports with respect to research and development projects will contain a certification that the State Agency has contributed at least 25 percent of the total project cost.

(c) A mutual release will be executed by the State Agency and the Secretary, or his authorized representative, when both parties have fulfilled their respective obligations under the agreement or contract.

(d) Copies of audit reports on audits of projects made by State auditors or inspectors shall be furnished the Secretary and will not be returned to State Agencies.

§ 253.8 **Record retention.**

(a) All records of accounts, reporting and supporting documentation thereto will be retained by the State or State Agency for a period of 3 years after the project is completed.

(b) Loan applicants, to whom a loan has been granted pursuant to section 9 of Public Law 88–309 or § 253.4(a)(3), shall retain all records incident to the fishing operation for a period of 3 years after the Note has been satisfied.

§ 253.9 **Audit and inspection.**

(a) Authorized representatives of the Department of the Interior and the United States General Accounting Office shall have the right to audit, examine or inspect accounts, books, documents and other pertinent records involving operations and transactions under the regulations in this part.

(b) State Agencies are expected to provide for a system of periodic internal review or audit by State employees.

(c) Periodic audits will be performed on projects with State Agencies and other operations provided for in Public Law 88–309 by authorized representatives of the United States Government. Audits may be performed on active projects and within 3 years after the project is completed.

(d) Audit exceptions involving adjustments in payment to any State Agency on any project, whether active or completed, may be applied to other approved projects or to applicable apportionments of funds to State Agencies.

§ 253.10 **Officials not to benefit.**

No member of or delegate to Congress or resident commissioner, shall be admitted to any share or any part of an agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

§ 253.11 **Patents and inventions.**

Determination of the patent rights in any inventions or discoveries made in the course of or under any research and development contract entered into pursuant to the Act shall be governed by the Statement of Government Patent Policy promulgated by the President in his memorandum of October 10, 1963 (3 CFR 1963 Supp. p. 238, 28 F.R. 10943).

§ 253.12 **Convict labor.**

In connection with the performance of work, the State Agency agrees not to employ any person undergoing sentence of imprisonment at hard labor.

This amendment shall become effective on the date of publication in the FEDERAL REGISTER.

JOHN M. KELLY,
Acting Secretary of the Interior.

OCTOBER 1, 1964.

Note: See <u>Commercial Fisheries Review</u>, October 1964 pp. 25, 85; September 1964 p. 100; August 1964 p. 95.

* * * * *

PROPOSED REGULATIONS FOR FISHING VESSEL CONSTRUCTION ASSISTANCE ANNOUNCED:

Proposed regulations to govern the operation of a new program (United States Fishing Fleet Improvement Act--Public Law 88-498) to encourage construction of fishing vessels in United States shipyards were announced by the U. S. Department of the Interior on October 8, 1964, and published in that day's <u>Federal Register</u>.

The United States Fishing Fleet Improvement Act provides for payment, under certain conditions, of the difference between building a vessel in United States shipyards and in less expensive foreign shipyards, with a maximum payment of 50 percent of the United States cost. The legislation was signed by President Johnson August 30, 1964. It authorized the appropriation of \$10 million annually for the program. Just before adjourning, Congress voted a \$2.5 million appropriation to operate the program for the current Fiscal Year (July 1, 1964 - June 30, 1965).

To be eligible, a vessel must be "of advance design," as further defined in the proposed regulations, but must not cause economic hardship to efficient vessel operations already working in the same fishery. An applicant must possess the ability, experience, resources and other qualifications necessary to operate and maintain the new vessel. A hearing is to be held on each application.

Under the proposed rules, the vessel must be a modern one which will upgrade the fleet, and special consideration will be given vessels which will provide a significant contribution in helping the domestic fishery meet foreign competition.

Notice of Proposed Rule Making as published in the <u>Federal Register</u>, October 8, 1964, follows:

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[50 CFR Part 256]

FISHING VESSEL CONSTRUCTION DIFFERENTIAL SUBSIDY PROCEDURES

Notice of Proposed Rule Making

Notice is hereby given that pursuant to the authority vested in the Secretary of the Interior by the Act of June 12, 1960 (P.L. 86–516; 46 U.S.C. 1401–1413), as amended, it is proposed to revise 50 CFR Part 256 as set forth below. The purpose of the revision is to incorporate

those changes necessitated by the enactment of the United States Fishing Fleet Improvement Act (P.L. 88-498) which was approved on August 30, 1964. This Act amended the Act of June 12, 1960, by extending the date for receipt of applications and changed the eligibility requirements as well as increasing the maximum amount of the subsidy which can be paid. Due to the numerous changes being proposed, the procedures will be more readily understood if the entire part is revised.

This proposed regulation relates to matters which are exempt from the rule making requirements of the Administrative Procedure Act (5 U.S.C. 1003); however, it is the policy of the Department of the Interior that, whenever practicable, the rule making requirements be observed voluntarily. Accordingly, interested persons may submit in triplicate written comments, suggestions, or objections with respect to the proposed amendments to the Director, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C., 20240, within 30 days of the date of publication of this notice in the FEDERAL REGISTER.

Part 256 reads as follows:

AUTHORITY: The provisions of this Part 256 issued under sec. 10, P.L. 86-516, as amended.

§ 256.1 Basis and purpose.

(a) The Act of June 12, 1960 (P.L. 86-516), as amended and hereinafter referred to as the Act, authorizes the Secretary of the Interior to pay a subsidy for the construction of fishing vessels in shipyards of the United States.

(b) The purpose of this part is to prescribe rules and regulations governing the payment of these subsidies.

§ 256.2 Definitions.

(a) *Secretary.* The Secretary of the Interior or his authorized representative.

(b) *Administrator.* The Maritime Administrator in the Department of Commerce or his authorized representative.

(c) *Person.* Individual, association, partnership or corporation, or any one or all as the context requires.

(d) *Fishery.* A segment of the commercial fishing industry engaged in the catching of a single species or a group of species of fish and shellfish. To be considered as operating in a fishery, the catch of species in that fishery must amount to at least fifty-one percent (51%) (at the option of the owner by ex-vessel weight or ex-vessel value) of the total catch of the vessel during the calendar year.

(e) *Expanded areas.* Fishing grounds not usually fished by the majority of the vessels operating in the fishery for which the proposed vessel is designed.

(f) *Newly developed gear.* The most modern gear available that is suitable for use in the fishery for which the proposed vessel is designed.

§ 256.3 Eligibility requirements.

(a) Vessel will be of advance design: In order to be considered to be of advance design, the vessel must be designed to have significant advantages in utility and efficiency over a significant number of vessels engaged in the fishery in which the proposed vessel is designed to operate.

(b) No economic hardship to efficient vessel operators: The determination that operation of a proposed vessel will not cause economic hardship to efficient vessel operators already operating in that fishery shall be made by the Secretary after notice and hearing, taking into consideration the condition of the resource, the efficiency of the vessels and gear being operated in that fishery compared with the proposed vessel, the prospects of the market for the species caught, and the degree and duration of any anticipated economic hardship.

(c) Aid in the development of the United States fisheries: For the vessel to aid in the development of the United States fisheries under conditions that the Secretary considers to be in the public interest, the vessel must be a modern vessel which will upgrade the fleet. Special consideration will be given to vessels which will provide a significant contribution in helping the domestic fishery meet foreign competition.

(d) The applicant possesses the ability, experience, resources and other qualifications necessary to enable him to operate and maintain the proposed new fishing vessel. In making this determination, the Secretary will inquire into the economic feasibility of the fishing venture and will require reasonable assurance that the applicant can operate the vessel profitably.

§ 256.4 Applications.

Applications for a subsidy shall be made on forms prescribed by the Secretary and shall be filed with the Director, Bureau of Commercial Fisheries, Washington, D.C. The applications must be accompanied by three copies of the cross section, deck arrangement, outboard profile, and specifications of the proposed vessel. The Secretary may require such additional complete detailed construction plans as may be necessary after a review of the application and accompanying plans and specifications.

§ 256.5 Notice and hearing.

After receipt of an application eligible on its face for a construction differential subsidy the Secretary will publish a Notice of Hearing on a Subsidy Application in the FEDERAL REGISTER and hold hearings in accordance therewith. The purpose of the hearing will be to provide any person who feels he will be economically injured by the construction of the proposed vessel to cross-examine witnesses and/or present evidence that the operation of such vessel will cause economic hardship to efficient vessel operators already operating in the fishery for which the vessel is designed. Hearing procedures will be held in accordance with Part 257 of this subchapter.

§ 256.6 Subsidy contract.

(a) A contract for the payment of the subsidy will take effect when all contracts between the applicant for such subsidy and the shipbuilder, who is to construct such vessel, have been approved by the Administrator and the subsidy contract has been signed by the Secretary and the applicant; and

(b) The contract shall contain a finding of the useful life of the vessel as determined by the Secretary to be used in computing the amount of the total depreciated construction subsidy to be repaid to the Secretary in accordance with section 9 of the Act.

§ 256.7 Vessel operations.

(a) If the owner of a fishing vessel constructed with the aid of a subsidy desires to operate it in a different fishery than the one for which it was designed because of an actual decline in that particular fishery, he shall submit an application to the Secretary for permission to transfer the operations of the vessel to a different fishery. The application shall contain data showing the decline in the fishery for which the vessel was designed, how this decline is making the operation of the vessel uneconomical or less economical, and why the transfer will not cause economic hardship or injury to efficient vessel operators already operating in the fishery to which he wishes to transfer operations.

(b) Upon receipt of such an application the Secretary will publish a Notice of Hearing on an Application to Change Fishery in the FEDERAL REGISTER and hold hearings in accordance therewith. The purpose of the hearings will be to provide any person who feels he will be economically injured by said transfer of fishing operations an opportunity to cross-examine witnesses and/or present evidence that such a transfer of operations will cause economic hardship or injury to efficient vessel operators already operating in the fishery to which the vessel's operations would be transferred. Hearing procedures will be held in accordance with Part 257 of this subchapter.

§ 256.8 Penalties.

In case the Secretary shall find that a vessel has operated contrary to the provisions of the Act or of regulations issued thereunder, he shall immediately notify the owner in writing of the specific acts involved and the amount of the penalty. The vessel owner may appeal such a finding to the Secretary in writing within 30 days of the date of mailing such finding to the last known address of the vessel owner. The amount of penalty assessed in any one year shall be equal to the total subsidy paid multiplied by the ratio that one year bears to the total number of years determined, by the Secretary, as the useful life of the vessel: *Provided, however,* That if this amount is not paid within 60 days after receipt of notice then the amount due shall be the total amount of the subsidy paid depreciated to the beginning of the year in which the vessel operated unlawfully. Any amount due hereunder shall constitute a maritime lien against the vessel effective at the time the Secretary determines that the vessel has operated in violation of the Act or regulations.

§ 256.9 Inspection of vessels.

The Secretary or the Administrator shall have access at all times to all vessels which are being constructed under a contract providing for a construction subsidy provided for by the Act.

§ 256.10 **Payment of subsidy.**

The subsidy will be paid to the applicant after the vessel is completed and evidence of full payment to the shipyard constructing the vessel is presented; or jointly to the applicant and the shipyard upon completion and delivery of the vessel.

ROBERT M. PAUL,
Deputy Assistant Secretary of the Interior.

OCTOBER 2, 1964.

* * * * *

PROPOSED REGULATIONS ANNOUNCED FOR NOTICE AND HEARING REQUIREMENTS OF FISHING FLEET IMPROVEMENT ACT:

Proposed regulations to provide procedures for notice and hearing requirements of the United States Fishing Fleet Improvement Act (Public Law 88-498) were announced by the U. S. Department of the Interior and published in the Federal Register, October 29, 1964. The Act, as amended, requires a notice and hearing on certain phases of each application for a fishing vessel construction subsidy and for permission for a vessel to change fisheries when such vessel has been constructed with the aid of the subsidy.

The proposed regulations on procedures for notice and hearing requirements include: basis and purpose; definitions; scope of rules; authentication; inspection of records; appearance and practice; form, execution and service of documents; notice, pleadings and replies; hearing procedure; evidence; and decisions.

Interested persons were given until November 17, 1964, to submit written comments, suggestions, or objections on the proposed regulations to the Director, Bureau of Commercial Fisheries.

The regulations as they appeared in the Federal Register follow:

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[50 CFR Part 257]

RULES OF PRACTICE AND PROCEDURE FOR NOTICE AND HEARING ON SUBSIDIES

Notice of Proposed Rule Making

Notice is hereby given that pursuant to the authority vested in the Secretary of the Interior by the Act of June 12, 1960 (Public Law 86–516; 46 U.S.C. 1401–1413), as amended, it is proposed to adopt 50 CFR Part 257 as set forth below. The purpose of these regulations is to provide procedures for notice and hearing requirements of the United States Fishing Fleet Improvement Act (Public Law 88–498) which was approved August 30, 1964. This Act amended the Act of June 12, 1960, and requires a notice and hearing on certain phases of each application for a subsidy and for permission for a vessel to change fisheries when such vessel has been constructed with the aid of this subsidy.

This proposed regulation relates to matters which are exempt from the rule making requirements of the Administrative Procedure Act (5 U.S.C. 1003); however, it is the policy of the Department of the Interior that, whenever practicable, the rule making requirements be observed voluntarily. Accordingly, interested persons may submit written comments, suggestions, or objections with respect to the proposed amendments to the Director, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C., 20240, within 20 days of the date of publication of this notice in the FEDERAL REGISTER.

Sec.
257.1 Basis and purpose.
257.2 Definitions.
257.3 Scope of rules.
257.4 Mailing address.
257.5 Authentication.
257.6 Inspection of records.
257.7 Appearance and practice.
257.8 Parties.
257.9 Form, execution and service of documents.
257.10 Notice, pleadings and replies.
257.11 Duties of Presiding Officer.
257.12 Hearing procedure.
257.13 Evidence.
257.14 The record.
257.15 Decisions.

AUTHORITY: The provisions of this Part 257 issued under the Act of June 12, 1960 (Public Law 86–516), as amended.

§ 257.1 **Basis and purpose.**

(a) The Act of June 12, 1960 (Public Law 86–516), as amended by the United States Fishing Fleet Improvement Act (Public Law 88–498) authorizes the Secretary of the Interior to pay a subsidy for the construction of fishing vessels in shipyards of the United States and requires that this be done only after Notice and Hearing.

(b) The purpose of this part is to establish rules of practice and procedure for the notice and hearing.

§ 257.2 **Definitions.**

Definitions shall be the same as in Part 256 of this subchapter.

§ 257.3 **Scope of rules.**

The regulations in this part govern the procedure in hearings subject to Part 256 of this subchapter. These hearings are subject to the Administrative Procedure Act (5 U.S.C. 1003, et seq.) and Practice Before The Department of the Interior (43 CFR Part 1). The regulations shall be construed to secure the just, speedy, and inexpensive determination of every proceeding with full protection for the rights of all parties therein.

§ 257.4 **Mailing address.**

Documents required to be filed in, and correspondence relating to, proceedings governed by the regulations in this part shall be addressed to the Director, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C., 20240.

§ 257.5 Authentication.

All rules, orders, determinations, and decisions of the Secretary shall be signed by the Secretary.

§ 257.6 Inspection of records.

The files and records of these hearings, except those held by the Secretary for good cause to be confidential, shall be open to inspection and copying as follows:

(a) All pleadings, motions, depositions, correspondence, exhibits, transcripts of testimony, exceptions, briefs, and decisions in any formal proceeding under this part may be inspected and copied in the office of the Chief, Branch of Loans and Grants, Bureau of Commercial Fisheries, Department of the Interior, Washington, D.C., 20240.

(b) Orders, rules, rulings, opinions, determinations, and decisions may be inspected in the office of the Chief, Branch of Loans and Grants, except those held by the Secretary for good cause to be confidential and not cited as precedents.

§ 257.7 Appearance and practice.

(a) A party may appear in person or by an officer, partner or regular employee of the party; by or with counsel or as otherwise permitted by 43 CFR Part 1 in any proceeding under the regulations in this part. A party may offer testimony, produce and examine witnesses, and be heard upon brief and at oral argument if oral argument is granted by the Presiding Officer. Attorneys-at-law who are admitted to practice before the Federal Courts or before the courts of any State or possession of the United States, may represent a party as counsel.

(b) Persons who appear at any hearing shall deliver a written notice of appearance to the official reporter, stating for whom the appearance is being made. The Presiding Officer may require a person making an appearance in a representative capacity to show his authority to act in such capacity. The written appearance shall be made a part of the record.

§ 257.8 Parties.

(a) The term "party" shall include any natural person, corporation, association, firm, partnership, trustee, receiver, cooperative or governmental agency determined by the Presiding Officer as having an interest in the proceedings. A party making an application shall be designated as "applicant." A party whose petition for leave to intervene is granted shall be designated an "intervenor." Only a party as designated in this section may introduce evidence or examine witnesses at hearings.

(b) For an intervenor to prove an interest in the hearings he must show that there is a reason for belief that the operation of the vessel described in the application will cause economic injury or hardship to efficient vessel operators already operating in the fishery in which it is proposed that the vessel be operated.

§ 257.9 Form, execution and service of documents.

(a) All papers to be filed under the regulations in this part shall be clear and legible; and shall be dated, signed in ink, contain the docket description and title of the proceeding and the title, if any, and the address of the signatory. Five copies of all papers are required to be filed. Documents filed shall be executed by (1) the person or persons filing same, (2) by an authorized officer thereof if it be a corporation or, (3) by an attorney or other person having authority with respect thereto.

(b) All documents, when filed, shall show that service has been made upon all parties to the proceeding. Such service shall be made by delivering one copy to each party in person or by mailing by first class mail, properly addressed with postage prepaid. When a party has appeared by attorney or other representative, service on such attorney or other representative will be deemed service upon the party. The date of service of document shall be the day when the matter served is deposited in the United States mail, shown by the postmark thereon, or is delivered in person, as the case may be.

(c) The original of every document filed under this part and required to be served upon all parties to a proceeding shall be accompanied by a certificate of service signed by the party making service, stating that such service has been made upon each party to the proceeding. Certificates of service may be in substantially the following form:

I hereby certify that I have this day served the foregoing document upon all parties of record in this proceeding by: (1) Mailing postage prepaid, (2) delivering in person, a copy to each party.

Dated at __________ this ______ day of __________ 19__.

Signature ____________________

§ 257.10 Notice, pleadings and replies.

(a) After acceptance of an application eligible on its face for construction subsidy or for the transfer of a vessel to a different fishery, the Director, Bureau of Commercial Fisheries, shall publish a notice of hearing in the FEDERAL REGISTER advising that a hearing will be held not less than 30 days after date of such publication and setting the time and place and providing details with respect to such hearing. Any person desiring to intervene and present evidence that the approval of the application will cause economic injury or hardship to efficient vessel operators must file, at least 10 days prior to the date set for the hearing (unless otherwise consented to by the Presiding Officer), a Petition of Intervention setting forth his interest. The hearing will be held in Washington, D.C., unless such a petition is received. If such a petition is received, the Presiding Officer may designate a different hearing site by telegraphic notice to the parties in the proceedings. If no petition to intervene is received, it will not be necessary for the applicant to appear at the hearing if he files all information in writing as required by the Presiding Officer.

(b) All petitions shall be in writing and shall state the petitioner's grounds of interest in the subject matter; the facts relied upon, the relief sought; and shall cite the authority upon which the petition rests. The petition shall be served upon all parties named therein or affected thereby. Answers to petitions must be filed within 5 days of the hearing date, unless otherwise consented to by the Presiding Officer.

(c) Amendments or supplements to pleadings may be allowed or refused in the discretion of the Presiding Officer. The Presiding Officer may direct a party to state its case more fully and in more detail by way of amendment. If a response to an amended pleading is necessary, it may be filed and served within the time set by the Presiding Officer. Amendments or supplements allowed prior to hearing will be served in the same manner as the original pleading.

(d) All motions and requests for rulings shall state the relief sought, the authority relied upon and the facts alleged. If made before or after the hearing, such motions shall be in writing. If made at the hearing, motions may be stated orally: *Provided, however,* that the Presiding Officer may require such motion to be reduced to writing and filed and served in the same manner as a formal motion. Oral argument upon a written motion, in which an answer has been filed, may be granted within the discretion of the Presiding Officer. Answers to a formal motion or pleading shall be filed and served in the same manner as the motion or pleading.

§ 257.11 Duties of Presiding Officer.

The Presiding Officer shall have the authority and duty to:

(a) Take or cause depositions to be taken.

(b) Rule upon proposed amendments or supplements to motions and pleadings.

(c) Regulate the course of the hearings.

(d) Prescribe the order in which evidence shall be presented.

(e) Dispose of procedural requests or similar matters.

(f) Hear and initially rule upon all motions and petitions before him.

(g) Administer oaths and affirmations.

(h) Examine witnesses.

(i) Rule upon offers of proof and receive competent, relevant, material, reliable, and probative evidence.

(j) Exclude irrelevant, immaterial, incompetent, unreliable, repetitious or cumulative evidence.

(k) Exclude cross-examination which is primarily intended to elicit self-serving declarations in favor of the witness.

(l) Limit cross-examination to interrogatories which are required for a full and true disclosure of the facts in issue.

(m) Act upon petitions to intervene.

(n) Act upon submissions of facts or arguments.

(o) Hear arguments at the close of testimony.

(p) Fix the time for filing briefs, motions and other documents to be filed in connection with hearings.

(q) Issue the intial decisions and dispose of any other pertinent matter that normally and properly arises in the course of proceedings.

§ 257.12 Hearing procedure.

(a) Unless authorized by the Presiding Officer, witnesses will not be permitted to read prepared testimony into the record. The evidentiary record shall be limited to factual and expert opinion testimony. Arguments will not be received in evidence but should be presented in opening and/or closing statements or in briefs to the Presiding Officer. All exhibits and responses to requests for evidence shall be numbered consecutively by the party submitting same and shall be filed with the Presiding Officer if filed during the hearing. If filed at some other time they should be filed in accord-

ance with § 257.4 with one copy also being sent to each party to the hearing.

(b) Normally, the order of presentation at the hearing will be alphabetical in each of the following categories:

(1) Applicant,

(2) Intervenors.

Rebuttal should be presented without any adjournment in the proceedings.

(c) Cross-examination shall be limited, subject to § 257.13(b), to the scope of the direct examination and to witnesses whose testimony is adverse to the party desiring to cross-examine. Only cross-examination which is necessary to test the truth and completeness of the direct testimony and exhibits will be permitted.

(d) A request for oral argument at the close of testimony will be granted or denied by the Presiding Officer in his discretion.

(e) Rulings of the Presiding Officer may not be appealed prior to, or during, the course of the hearings, except in extraordinary circumstances where prompt decision by the Secretary is necessary to prevent unusual delay or expense, in which instance the matter shall be referred forthwith to the Secretary by the Presiding Officer. Any appeal shall be filed within 10 days from the date of the close of the hearing.

§ 257.13 Evidence.

(a) In any proceedings under this part, all evidence which is relevant, material, reliable and probative, and not unduly repetitious or cumulative, shall be admissible. Irrelevant and immaterial or unduly repetitious evidence shall be excluded.

(b) Each party shall have the right to present his case or defense by oral or documentary evidence, to submit rebuttal evidence; and to conduct such cross-examination as may be required for a full and true disclosure of the facts.

(c) At any time during the hearing the Presiding Officer may call for the production of further relevant and material evidence, reports, studies and analyses upon any issue, and require such evidence to be presented by the party or parties concerned, either at the hearing or adjournment thereof. Such material shall be received subject to appropriate motions, cross-examination and/or rebuttal. If a witness refuses to testify or produce the evidence as requested, the Presiding Officer shall forthwith report such refusal to the Secretary.

§ 257.14 The record.

(a) The Director, Bureau of Commercial Fisheries, will designate an official reporter for all hearings. The official transcript of testimony taken, together with any exhibits and briefs filed therewith, shall be filed with the Director, Bureau of Commercial Fisheries. Transcripts of testimony will be available in any proceeding under the regulations of this part, and will be supplied by the official reporter to the parties and to the public, except when required for good cause to be held confidential, at rates fixed by the contract between the United States of America and the reporter. If the reporter is an employee of the Department of the Interior, the rate will be fixed by the Director, Bureau of Commercial Fisheries.

(b) The transcript of testimony and exhibits, together with all papers and requests, including rulings and the initial decision filed in the proceeding, shall constitute the exclusive record for decision. The initial decision will be predicated on this same record, as will the final decision.

§ 257.15 Decisions.

(a) The Presiding Officer is delegated the authority to render initial decisions in all proceedings before him. The same officer who presides at the reception of evidence shall render the initial decision except when such officer becomes unavailable to the Department of the Interior. In such case, another Presiding Officer will be designated by the Secretary to render the initial decision. Briefs, or other documents, to be submitted after the hearing must be received not later than ten (10) days after the hearing unless otherwise extended by the Presiding Officer upon motion by a party. The initial decision shall be made within twenty (20) days after the hearing or the receipt of all briefs, whichever is later. If no appeals from the initial decision are received within ten (10) days of the date of the initial decision, it will become the final decision on the twentieth day following the date of the initial decision. If an appeal is received, the appeal will be transmitted to the Secretary who will render the final decision after considering the record and the appeal.

(b) All initial and final decisions, shall include a statement of findings and conclusions, as well as the reasons or basis therefor, upon the material issues presented. A copy of each decision shall be served on the parties to the proceeding, and furnished to interested persons upon request.

(c) Official notice may be taken of such matters as might be judicially noticed by the courts; or of technical or scientific facts within the general or specialized knowledge of the Department of the Interior as an expert body; or of a document required to be filed with or published by a duly constituted Government body: *Provided*, That where a decision or part thereof rests on the official notice of a material fact not appearing in the evidence of the record, the fact of official notice shall be so stated in the decision and any party, on timely request, shall be afforded an opportunity to show the contrary.

FRANK P. BRIGGS,
Assistant Secretary of the Interior.

OCTOBER 26, 1964.

Small Business Administration

LOANS TO NEW ENGLAND COMMERCIAL FISHERIES FIRMS IN SEPTEMBER 1964:

Approval of 2 commercial fisheries loans in September 1964 was announced October 6, 1964, by the Boston Regional Office of the Small Business Administration (SBA).

A $15,000 direct loan to run 6 years at 4 percent interest was made to Plymouth Packing Co., Inc., Plymouth, Mass. The firm has been established to process and distribute precooked frozen stuffed lobster. The loan funds were for machinery and equipment ($3,800), inventory ($5,000), packaging supplies ($3,200), and working capital ($3,000).

A $2,000 direct loan was made to Frank L. Howard, Jr., Portsmouth, N. H., who operates a restaurant and lobster fishing business.

* * * * *

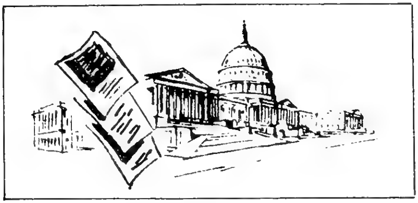
DISASTER LOANS FOR HURRICANE-DAMAGED AREAS:

The Small Business Administration (SBA) has authorized disaster loan assistance in those areas of Florida, Georgia, Alabama, Mississippi, and Louisiana damaged by the recent hurricanes and accompanying tornadoes. Disaster loans at 3 percent interest and terms up to 20 years are available to help restore businesses and homes suffering storm damage. Field agents of the Small Business Administration should be contacted for additional information.

Eighty-Eighth Congress

(Second Session)

Public bills and resolutions which may directly or indirectly affect the fisheries and



allied industries are reported upon. Introduction, referral to committees, pertinent legislative actions by the House and Senate, as well as signature into law or other final disposition are covered.

AGRICULTURAL DEPARTMENT APPROPRIATIONS: Agricultural Appropriations for 1965, Hearings before the Subcommittee of the Committee on Appropriations, United States Senate, 88th Congress, 2nd Session, on H.R. 11202, making Appropriations for the Department of Agriculture and the Farm Credit Administration for the fiscal year ending June 30, 1965, and for other purposes, 1,415 pp., printed; Volume II, Farmers Home Administration, Rural Electrification Administration, Testimony of Members of Congress, Organizations and Individuals, Reports to the Committee from Department of Agriculture, 868 pp., illus., printed. Hearings began March 10, 1964, and were completed July 22, 1964. Contents consist of Departmental testimony justifying the request for funds. Included are statements and testimony on the Agriculture Market News Service and its new services.

CHEMICAL PESTICIDES COORDINATION: Interagency Coordination in Environmental Hazards (Pesticides), Hearings before the Subcommittee on Reorganization and International Organizations of the Committee on Government Operations, United States Senate, 88th Congress, 1st Session, Agency Coordination Study (Pursuant to S. Res. 27, 88th Cong., as amended). Coordination of Activities Relating to the Use of Pesticides, Part 1 (including exhibits), May 16, 22, 23, June 4, 25, 1963; Part 2 (including exhibits), July 17, 1963; Part 3 (including exhibits) July 18 and 23, 1963; Part 4 (including exhibits), Aug. 20 and 21, 1963; 1,059 pp., illus., printed. Included are testimonies and exhibits submitted by various Federal and state officials, Senators, doctors, associations, and representatives of business firms. The Subcommittee examined interagency coordination in environmental hazards and the role of the Federal Government as it deals with man's contamination of his environment. The Chairman pointed out that contamination comes from many sources and has many effects--in air, water, soil, crops, food, wildlife, and human beings. One consequence of this chemical age in which we live is the hazard to the environment created by use of chemical poisons to control insects and other pests, eliminate undesired vegetation, and prevent the infection of plants and animals--including man--by disease organisms. The use of chemical poisons is widespread and growing. The National Academy of Sciences estimates that since World War II the production of pesticides, including herbicides, fungicides, and insecticides has reached a total of approximately 1 billion pounds annually or about 6 pounds per person. The chemicals have a great potential for good and for harm. The purpose of the hearings was to find out just what the problem is, how much we know about it, and don't know, and what the Government, industry, and the public are doing about it. Of special concern is the extent to which the various Federal agencies interested in the problem coordinate their activities, exchange information, and administer their various programs of research, use, and regulation in an efficient and economical manner.

FISH PROTEIN CONCENTRATE: Fish Protein Concentrate, Hearing before the Subcommittee on Merchant Marine and Fisheries of the Committee on Commerce, United States Senate, 88th Congress, 2nd session on Federal Government's research program on fish protein concentrate, Aug. 14, 1964, Serial No. 60, 130 pp., illus., printed. Contents include statements and letters of various Federal officials, Senators, and Sport Fishing Institute. The Committee pointed out that for some 3 years now the U.S. Bureau of Commercial Fisheries has been carrying on research aimed at the development of a concentrate from fish which would provide an inexpensive yet protein-rich supplement. In fiscal 1962 Congress appropriated $50,000 for preliminary research efforts. The project has gotten under way on a larger scale during the last 2 years with annual appropriations of approximately $450,000. With those funds, the Bureau is carrying on extensive experiments in its laboratories in College Park, Md. Various processes and reagents are being tested. Nutrition studies are also being carried out. Other studies have been let out on contract by the Bureau. The Chairman stated that the purpose of the hearing was to bring the Congress and the public up to date on the progress that is being made. The development of an inexpensive protein supplement could enrich the diets of people around the world--some 2 million of whom suffer from a protein deficiency. The Chairman also said that they hoped in the course of the hearing to learn what standards a marketable concentrate would have to meet, how the products the Bureau has developed stand in relation to those standards, and how expensive or difficult they would be to produce. When time permits the scheduling of a more extensive hearing is planned, according to the Chairman.

HAWAIIAN ISLANDS: H. Doc. 353, Coasts of the Hawaiian Islands, Letter from the Secretary of the Army, transmitting a letter from the Chief of Engineers, Department of the Army, Dated May 15, 1964, Submitting a Report, Together with Accompanying Papers and Illustrations, on an Interim Survey of the Coasts of the Hawaiian Islands, Authorized by the River and Harbor Act Approved May 17, 1950; referred to Committee on Public Works, House of Representatives, 88th Congress, 2nd Session, Aug. 19, 1964, 119 pp., illus., printed. Contains favorable report from the Army Chief of Engineers, of harbors for light-draft vessels at eight harbor sites in Hawaii. Besides the report of the district engineer (giving the authority, description of harbors, and economic analysis, results of investigation, and recommendations), it contains comments from various Federal agencies, State of Hawaii, and reports from Chief of Engineers and Board of Engineers for Rivers and Harbors. One section of the report deals with Hawaii's commercial fishing industry and discusses (1) scale of industry and fish catch; (2) fishing boats and type of op-

erations; and (3) future growth of fishing industry. Several appendixes appear, including design and cost estimate; benefits; economic base study of the State of Hawaii; coordination with other agencies; and summary of public hearings.

INDIAN FISHING RIGHTS: Indian Fishing Rights, Hearings before the Subcommittee on Indian Affairs of the Committee on Interior and Insular Affairs, United States Senate, 88th Congress, 2nd Session, on S. J. Res. 170 and S. J. Res. 171 (Joint resolutions regarding Indian fishing rights), Aug. 5-6, 1964, 251 pp., printed. Contents include texts and departmental reports (Interior, Justice) on both bills; statements and communications of Indian Tribes, Federal and state officials, and associations; affidavits of noted biologists and fisheries experts; U.S. Supreme Court case citations; commercial landings of spring, summer and fall chinook and sockeye salmon and steelhead trout, 1951-63; Indian tribal ordinances, fishing regulations, and resolutions; steelhead catch in 1962; Washington State Supreme Court and Superior Court discussions and opinions. S. J. Res. 170 would authorize states to enact and to enforce laws of a purely regulatory nature concerning the time and manner of fishing outside an Indian Reservation that are for the purpose of conservation of fish, and that are equally applicable to Indians and all other citizens without distinction; and that legislation enacted pursuant to this law is declared to be in furtherance of and not in derogation of the treaties involved. S. J. Res. 171 would provide for the acquisition by the Secretary of the Interior of the Indian treaty rights.

TRADE AGREEMENTS PROGRAM: H. Doc. 366, Eighth Annual Report of the President of the United States on the Trade Agreements Program, Message from the President of the United States, transmitting, The Eighth Annual Report on the Operation of the Trade Agreements Program, in Accordance with Section 402 (a) of the Trade Expansion Act of 1962; referred to the Committee on Ways and Means, House of Representatives, 88th Congress, 2nd Session, Sept. 23, 1964, 27 pp., printed. This report lists the important advantages to the United States of expanding international trade in 1963. Discusses the United States and world trade in perspective; the new organizational arrangements of the trade agreements program under the Trade Expansion Act; the trade agreements program and the GATT; progress in 1963 on removal of foreign restrictions against United States exports; the revised tariff schedules; cases under the escape clause provisions; and resolution on trade negotiations adopted at the GATT ministerial meeting, May 16-21, 1963, Geneva.

PRESIDENT LAUDS SAN PEDRO FISHERMEN'S FIESTA

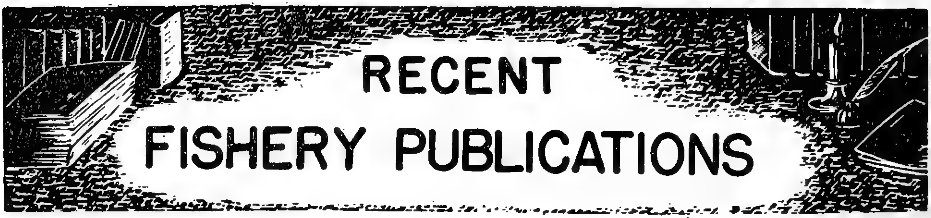
In 1964, San Pedro (Calif.) held its 14th annual Fishermen's Fiesta, October 23-25. A telegraph message from President Johnson read:

"I am delighted to extend to all who participate in the San Pedro Fishermen's Fiesta my good wishes for a successful festival.

"Few ways of life can boast the hardy traditions of the fisherman. Fishing is America's oldest occupation and one which continues to assume a vital role in the lives of our citizens.

"Your city has throughout its eventful life been one of our nation's foremost fishing ports. This enviable reputation brings just pride and distinction to the people of San Pedro which serves as a truly fitting place for a tribute to America's fishermen.

"I wish to express my warm appreciation to the men and women of San Pedro and to all Americans who strive to preserve the honor and dignity of the work of the fishermen. (Also see cover legend.)



FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE OFFICE OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON, D. C. 20402. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES.
MNL - REPRINTS OF REPORTS ON FOREIGN FISHERIES.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.
SSR.- FISH. - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).

Number	Title
CFS-3144	- Canned Fishery Products, 1962 Annual Summary (Revised), 17 pp.
CFS-3157	- Industrial Fishery Products, 1962 Annual Summary (Revised), 9 pp.
CFS-3536	- Virginia Landings, 1963 Annual Summary, 11 pp.
CFS-3565	- Gulf Coast Shrimp Data, February 1964, 16 pp.
CFS-3569	- Florida Landings, May 1964, 8 pp.
CFS-3570	- Maine Landings, June 1964, 4 pp.
CFS-3571	- Frozen Fishery Products, July 1964, 8 pp.
CFS-3575	- Massachusetts Landings, February 1964, 9 pp.
CFS-3577	- Michigan Landings, May 1964, 3 pp.
CFS-3578	- Massachusetts Landings, March 1964, 9 pp.
CFS-3579	- Virginia Landings, May 1964, 4 pp.
CFS-3580	- Maryland Landings, June 1964, 4 pp.
CFS-3581	- Texas Landings, January 1964, 2 pp.
CFS-3582	- Texas Landings, February 1964, 2 pp.
CFS-3585	- Mississippi Landings, January 1964, 2 pp.
CFS-3587	- New York Landings, June 1964, 5 pp.
CFS-3588	- North Carolina Landings, July 1964, 4 pp.
CFS-3591	- Mississippi Landings, February 1964, 2 pp.
CFS-3592	- Mississippi Landings, March 1964, 2 pp.
CFS-3593	- Mississippi Landings, April 1964, 2 pp.
CFS-3594	- Mississippi Landings, May 1964, 2 pp.
CFS-3595	- Louisiana Landings, June 1964, 3 pp.
CFS-3596	- Rhode Island Landings, April 1964, 3 pp.
CFS-3597	- Ohio Landings, May 1964, 3 pp.
CFS-3598	- Shrimp Landings, May 1964, 5 pp.
CFS-3599	- Gulf Coast Shrimp Data, May 1964, 24 pp.
CFS-3603	- California Landings, June 1964, 4 pp.
CFS-3605	- Florida Landings, June 1964, 8 pp.
CFS-3606	- Fish Meal and Oil, July 1964, 2 pp.
CFS-3609	- Mississippi Landings, June 1964, 3 pp.
CFS-3610	- Alabama Landings, January 1964, 2 pp.
CFS-3611	- Alabama Landings, February 1964, 2 pp.
CFS-3612	- Alabama Landings, March 1964, 3 pp.
CFS-3615	- Alabama Landings, June 1964, 3 pp.
CFS-3619	- Georgia Landings, March 1964, 2 pp.
CFS-3620	- Georgia Landings, April 1964, 2 pp.
CFS-3633	- Alabama Landings, July 1964, 3 pp.

Sep. No. 712 - Preliminary Report on Experimental Smoking of Chub (Leucichthys sp.).

Sep. No. 713 - Age Composition of the Commercial California Bluefin Tuna Catch in 1963.

SSR-Fish. No. 446 - Age and Size Composition of the Menhaden Catch Along the Atlantic Coast of the United States, 1958, with a Brief Review of the Commercial Fishery, by Fred C. June and William R. Nicholson, 44 pp., illus., May 1964.

SSR-Fish. No. 478 - Age and Size Composition of the Menhaden Catch along the Atlantic Coast of the United States, 1959, with a Brief Review of the Commercial Fishery, by William R. Nicholson and Joseph R. Higham, Jr., 37 pp., illus., July 1964. There were 705,000 tons of Atlantic menhaden (Brevoortia tyrannus) caught during the 1959 purse seine fishery with 614,000 tons taken during the summer fishery and 91,000 tons during the North Carolina fall fishery. This was the second largest catch in the period 1955-59. The number of purse-seine sets (33,099) also reached a record in the same 5-year period. The mean catch per set (21 tons) was the same as in 1958, when the smallest catch (551,000 tons) in 5 years was taken. The near-record catch was primarily the result of 2 exceptionally large year-classes. The 1958 year-class (age-1 fish) constituted 91 percent of the catch in the South Atlantic Area, 90 percent in the Chesapeake Bay Area, and 58 percent in the Middle Atlantic Area. The 1956 year-class accounted for 58 percent of the catch in the North Atlantic Area and 58 percent in the North Carolina fall fishery. Mean length and weight of age-1 fish in all areas was the smallest in 5 years.

Annual Report of the Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass. for Fiscal Year Ending June 30, 1962, by Joseph W. Slavin, Circular 182, 21 pp., illus., August 1964. The Laboratory located in the fishing port of Gloucester, Mass., one of six operated by the Bureau of Commercial Fisheries, specializes in investigations on improving the quality of those fish and shellfish indigenous to the North Atlantic area of the country. Major fisheries of that region include groundfish, sea herring, lobsters, sea scallops, oysters, and clams. The report discusses research on the chemistry and biochemistry of fish, radiation-pasteurization research, preservation and processing research, standards and specifications research, and inspection and certification of fishery products. Included are publications by Laboratory personnel and a list of papers presented at meetings.

THE FOLLOWING MARKET NEWS LEAFLETS ARE AVAILABLE FROM THE FISHERY MARKET NEWS SERVICE, U. S. BUREAU OF COMMERCIAL FISHERIES, RM. 510, 1815 N. FORT MYER DR., ARLINGTON, VA. 22209.

Number	Title
MNL-22	Republic of South Africa and Territory of South West Africa Fisheries, 1963 (Supplement), 8 pp.
MNL-56	Norwegian Fisheries, 1963, 8 pp.
MNL-75	Argentina's Fishing Industry, 1963, 6 pp.
MNL-81	France's Fishing Industry, 1963, 12 pp.
MNL-82	Fisheries of Ecuador, 1962-1963 and First Quarter 1964, 13 pp.
MNL-90	Belgian Fishing Industry, 1963, 32 pp.
MNL-91	Fisheries of Malaya, 1962-63, 23 pp.
MNL-92	Greenland's Fisheries during 1963, and 1964 Trends, 58 pp.

THE FOLLOWING ENGLISH TRANSLATION OF A FOREIGN LANGUAGE PUBLICATION IS AVAILABLE ONLY FROM THE BIOLOGICAL LABORATORY, U. S. BUREAU OF COMMERCIAL FISHERIES, 2725 MONTLAKE BLVD. E., SEATTLE, WASH. 98102.

Outline for a Fishery Economics Program, Translation Series No. 38, 10 pp., processed September 1963. (Translated from the Japanese, Fisheries Agency, Tokyo, Japan.)

THE FOLLOWING ENGLISH TRANSLATIONS OF FOREIGN LANGUAGE ARTICLES ARE AVAILABLE ONLY FROM THE ICHTHYOLOGICAL LABORATORY, BUREAU OF COMMERCIAL FISHERIES, U. S. NATIONAL MUSEUM, WASHINGTON, D. C. 20560.

Development of the Sense Organs of the Lateral Life Line System of the Perch and Ruff, by N. N. Disler, 66 pp., processed. (Translated from the Russian, Trudy Instituta Morfologii Zhivotnykh Imeni A. N. Severtsova, vol. 2, 1950, pp. 85-139.)

Geographical Distribution of Bathypelagic Fishes of the Family Nyctophidae in the Pacific Ocean, by Theodor S. Rass, 9 pp., processed. (Translated from the Russian, Trudy Instituta Okeanologii, Akademii Nauk, vol. 41, 1960, pp. 146-152.)

THE FOLLOWING ENGLISH TRANSLATION OF A FOREIGN LANGUAGE ARTICLE IS AVAILABLE ONLY FROM THE REGIONAL OFFICE, U. S. BUREAU OF COMMERCIAL FISHERIES, 101 SEASIDE AVE., TERMINAL ISLAND, CALIF. 90731.

Comments on Van Cleve and Johnson's Paper on the "Management of the High Seas Fisheries of the Northeastern Pacific," 21 pp., processed, October 1964. (Translated from the Japanese, Northern Waters Resources Research Council of Japan, Tokyo, Japan, September 1964, 31 pp.)

THE FOLLOWING PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

(Baltimore) Monthly Summary--Fishery Products, May and June 1964, 8 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 103 S. Gay St., Baltimore, Md. 21202.) Receipts of fresh- and salt-water fish and shellfish at Baltimore by species and by states and provinces; total receipts by species and comparisons with previous periods; and wholesale prices for fresh fishery products on the Baltimore market; for the months indicated.

California Fishery Market News Monthly Summary, Part I - Fishery Products Production and Market Data, August 1964, 16 pp. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif. 90731.) California cannery receipts of tuna and tunalike fish and other species used for canning; pack of canned tuna, tunalike fish, mackerel, and anchovies; market fish receipts at San Pedro, Santa Monica, and Eureka areas; California and Arizona imports; canned fish and frozen shrimp prices; ex-vessel prices for cannery fish; prices for fish meal, oil, and solubles; for the month indicated.

California Fishery Market News Monthly Summary, Part II - Fishing Information, August and September 1964, 15 and 8 pp., respectively, illus. (U. S. Bureau of Commercial Fisheries, Biological Laboratory, P. O. Box 6121, Pt. Loma Station, San Diego Calif. 92100.) Contains sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists; for the months indicated.

(Chicago) Monthly Summary of Chicago's Wholesale Market Fresh and Frozen Fishery Products Receipts, Prices, and Trends, July 1964, 17 pp. (Market News Service, U. S. Fish and Wildlife Service, U. S. Customs House, 610 S. Canal St., Rm. 1014, Chicago, Ill. 60607.) Receipts at Chicago by species and by states and provinces for fresh- and salt-water fish and shellfish; and weekly wholesale prices for fresh and frozen fishery products; for the month indicated.

Gulf of Mexico Monthly Landings, Production and Shipments of Fishery Products, August 1964, 11 pp. (Market News Service, U. S. Fish and Wildlife Service, Rm. 609, 600 South St., New Orleans, La. 70130.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; wholesale prices of fish and shellfish on the New Orleans French Market fishery imports at Port Isabel and Brownsville, Texas, from Mexico; Gulf menhaden landings and production of meal, solubles, and oil; and sponge sales; for the month indicated.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland. August and September 1964, 4 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 18 S. King St., Hampton, Va. 23369.) Landings of food fish and shellfish and production of crab meat and shucked oysters for the Virginia areas of Hampton Roads, Chincoteague, Lower Northern Neck, and Lower Eastern Shore; the Maryland areas of Crisfield, Cambridge, and Ocean City; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data on fishery products and shrimp production; for the months indicated.

New England Fisheries--Monthly Summary, August 1964, 22 pp. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston Mass. 02210.) Review of the principal New England fishery ports. Presents data on fishery landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold-storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Province town, and Woods Hole), Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and Boston Fish Pier and Atlantic Avenue fishery landings and ex-vessel prices by species; for the month indicated.

New York City's Wholesale Fishery Trade--Monthly Summary, July 1964, 18 pp. (Market News Service, U. S. Fish and Wildlife Service, 155 John St., New York , N. Y. 10038.) Includes summaries and analyses of receipts and prices on wholesale Fulton Fish Market, including both the salt- and fresh-water sections; imports entered at New York customs district; primary wholesalers' selling prices for fresh, frozen, and selected canned fishery products; marketing trends; and landings at Fulton Fish Market docks and Stonington, Conn.; for the month indicated.

Rampart Canyon Dam and Reservoir Project, Yukon River, Alaska, 122 pp., printed, 1964. (U. S. Fish and Wildlife Service, Subport Bldg., Juneau, Alaska 99801.)

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, September 1964, 9 pp. (Market News Service, U. S. Fish and Wildlife Service, 706 Federal Office Bldg., 909 First Ave., Seattle, Wash. 98104.) Includes Seattle's landings by the halibut and salmon fleets reported through the exchanges; landings of halibut reported by the International Pacific Halibut Commission; landings of otter-trawl vessels as reported by the Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and non-scheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; and imports from other countries through Washington customs district; for the month indicated.

THE FOLLOWING SERVICE PUBLICATION IS FOR SALE AND IS AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, U. S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D. C. 20402.

Outdoor Fish Cookery, Circular 189, 10 pp., July 1964, to be purchased in quantity at $35 for the first 1,000 and $18 for each additional 1,000. A folder containing recipes for outdoor preparation of a variety of fish and shellfish including bacon-wrapped smelt, scallop kabobs; and Louisiana shrimp boil, and peppy seafood sauce. Also offers tips on starting an outdoor fire, how to achieve a smoky flavor in the fish, and how to purchase fish portions.

"Photographing otoliths and scales," by Robert K. Brigham and Albert C. Jensen, article, The Progressive Fish-Culturist, vol. 26, no. 3, July 1964, pp. 131-135, illus., processed, single copy 25 cents.

Pondweeds and Pondweedlike Plants of Eastern North America, by Neil Hotchkiss, Circilar 187, 30 pp., 25 cents, July 1964.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ACCLIMATIZATION:

"Akklimatizatsiya ryb v vodoemakh Sovetskovo Soyuza" (Acclimatization of fish in waters of the Soviet Union), by A. Isaev, article, Rybovodstvo i Rybolovtvo, vol. 6, no. 2, 1963, pp. 7-10, illus., printed in Russian. Rybovodstvo i Rybolovstvo, Orlikov pereulok 1/11, Moscow, I-139, U. S. S. R.

AFRICA:

Directory of Fisheries Institutions in Africa, processed, March 1964. FAO Regional Fisheries Officer for Africa, P. O. Box 1268, Accra, Ghana.

ALGAE:

"Chemistry of diatomic algae (Diatomeae)," by G. K. Barashkov, article, 15 pp., processed, 1963. (Translated from the Russian, Botanicheakiy Zhurnal, Akademiya Nauk SSSR, vol. 45, no. 9, 1960, pp. 1350-1356.) Translation Division, Foreign Technology Division, Wright-Patterson Air Force Base, Ohio.

ANCHOVY:

"Areas de migracion y ecologia de la anchoa Lycengraulis olidus (Gunther) en las aguas argentinas (Pisces, fam. Engraulidae)" (Migration areas and ecology of the anchovy Lycengraulis olidus--Gunther--in Argentinian waters--Pisces, fam. Engraulidae), by M. L. Fuster de Plaza and E. E. Boschi, article, Contribuciones Ciencias Seria Zoologica Universidad Buenos Aires, vol. 1, no. 3, 1961, pp. 127-183, printed in Spanish with English summary. Universidad Nacionale de Buenos Aires, Facultad de Ciencias Exactas y Naturales, Buenos Aires, Argentina.

"Dinamika khimicheskogo sostava azovskoi khamsy v svyazi s osobennostyami ee biologii" (Relation of variations in the chemical composition of Azov anchovy Engraulis encrasicholus L. to characteristics of its biology), by G. E. Shul'man, article, Referativnii Zhurnal Biologiia, 1963, 3170, printed in Russian. Akademiia Nauk SSSR, Institut Nauchnoi-Informatsii, Moscow, U. S. S. R.

AQUATIC WEEDS:

"Control of aquatic weeds by the snail Marisa cornuarietis," by D. E. Seaman and W. A. Porterfield, article, Weeds, vol. 12, no. 2, 1964, pp. 87-91, illus., printed. Weed Society of America, University of Wisconsin, Madison, Wis.

ARGENTINA:

Produccion Pesquera Argentina en el Primer Semestre de 1964 (Fishery Production in Argentina in the First Half of 1964), 15 pp., processed in Spanish, August 1964. Departamento de Investigaciones Pesqueras, Direccion General de Pesca y Conservacion de la Fauna, Secretaria de Estado de Agricultura y Ganaderia, Buenos Aires, Argentina.

AUSTRALIA:

Australian Journal of Marine and Freshwater Research, vol. 15, no. 1, July 1964, 109 pp., illus., printed, single copy 10s. (about US$1.40). Editorial and Publications Section, CSIRO, Sixth Floor, 372 Albert St., East Melbourne, C2, Australia. Includes, among others, articles on: "The spiny lobster, Jasus lalandei (H. Milne-Edwards), in South Australia. I--Growth of captive animals," by D. R. Fielder; and "Subterranean freshwater prawns (Crustacea: Decapoda: Atyidae) in Australia," by W. D. Williams.

Eighth Annual Report of the Operation of the Fishing Industry Act 1956 during the Year Ended 30th June

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

1964, 7 pp., processed. Department of Primary Industry, Canberra, A. C. T., Australia.

AUSTRIA:

Österreichs Fischerei, no. 3/4, 1964, 52 pp., illus., printed in German. Bundesinstitut fur Gewasserforschung und Fischereiwirtschaft, Scharfling am Mondsee, Austria. Includes articles on: "Die exakt dosierte anwendung von hydratkall--ein neues heilverfahren bei fischerkrankungen" (Application of a precise dosage of hydrate of lime in a new treatment of fish diseases), by Wilhelm Einsele; "Die jauchevergiftung von fischen--eine ammoniakvergiftung" (Sewage water poisoning of fish--ammonia poisoning), by Elisabeth Danecker; and "Elektrofischerei und gewässerleitvermögen in Österreich" (Electric fishing and stream resources in Austria).

Selling in Austria, by Stuart M. Matlins, OBR 64-70, 12 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) High domestic economic activity, the availability of foreign exchange reserves, strong demand for both consumer goods and capital equipment, and the continuing liberalization of imports--all should assist United States exporters interested in selling in Austria. The report discusses import channels; import requirements; distribution practices; and transportation, port, and storage facilities. Also covers commercial practices in Austria, marketing aids, Government procurement, selling under United States programs, and information for business travelers.

BACTERIA IN FISH:

"Food putrefaction. III--Amine production by putrefactive bacteria in fish," by M. Katae and H. Kawaguchi, article, Bulletin, University of Osaka Prefecture, Ser. B, 1959, pp. 117-127, printed in Japanese. University of Osaka Prefecture, Osaka, Japan.

BACTERIOLOGY:

"Bacteriology of chilled water during the preservation of fish," by N. N. De Silva, article, Bulletin of the Fisheries Research Station of Ceylon, vol. 16, no. 1, 1963, pp. 1-24, printed. Department of Fisheries, P. O. Box 531, Galle Face, Colombo 3, Ceylon.

A Study of Some Organisms of Public Health Significance from Fish and Fishery Products, by M. D. Appleman, Nora Bain, and J. M. Shewan, Torry Memoir No. 165, 9 pp., printed. (Reprinted from The Journal of Applied Bacteriology, vol. 27, no. 1, April 1964, pp. 69-77.) Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

"Survival of staphylococci on frozen fish," by N. N. De Silva, article, Bulletin of the Fisheries Research Station of Ceylon, vol. 16, no. 2, 1963, pp. 11-18, printed. Department of Fisheries, P. O. Box 531, Galle Face, Colombo 3, Ceylon.

BASS:

The Life History of the Smallmouth Bass, Micropterus D. Dolmieui, at Waugoshance Point, Lake Michigan, by William C. Latta, Bulletin No. 5, 56 pp., printed, 1963. Institute for Fisheries Research, Ann Arbor, Mich.

BIBLIOGRAPHIES:

Agriculture, Food, Fishes, Forestry. Part I--PL-480 Translation Program, SB530, 18 pp., processed, February 1964, 10 cents. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230. Public Law 480 (Agricultural Trade Development and Assistance Act of 1954, as amended) authorized the President to enter into agreements with friendly nations for the sale abroad of American surplus agricultural commodities for foreign currencies. The PL-480 Translation Program is financed with currencies thus accrued in Israel, Poland, and Yugoslavia. Material to be translated is selected by scientists of United States agencies participating in the program, and arrangements are made in those countries for their translation and printing. As of January 1964, about 112,000 pages of translation from Russian, Polish, and Serbo-Croatian have been completed. A charge of about one cent a page is made to the public for this material, helping to offset the expense of handling. This report lists 55 translations on fisheries subjects.

Bibliography of Scientific Contributions, Final Report, 1 Oct. 55-30 Sept. 62, by J. B. Hersey, 15 pp., printed, October 1963. Woods Hole Oceanographic Institution, Woods Hole, Mass.

BIOCHEMISTRY:

"Effect of lipid content on protein-sodium linolenate interaction in fish muscle homogenates," by Margaret L. Anderson and Maynard A. Steinberg, article, Journal of Food Science, vol. 29, no. 3, 1964, pp. 329-330, printed. Institute of Food Technologists, 510-522 N. Hickory St., Champaign, Ill.

BOTULISM:

A Report to the Fishing Industry on the Significance of Botulism in the Canadian Fisheries, by Charles H. Castell, Circular (New Series) No. 14, 11 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada.

BRAZIL:

Basic Data on the Economy of Brazil, by Gertrude Heare, OBR 64-75, 24 pp., illus., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Discusses Brazil's geography, population, and Government; economic structure, industrial sectors; financial institutions; foreign trade; Government role in the economy; and economic outlook. Also contains a section covering the labor force, wages, and unemployment.

Conocimientos Actuales sobre la Pesca y la Biologia de las Especies Marinas de Importancia Comercial en el Sur del Brasil (Present Knowledge of the Fishery and the Biology of the Marine Species of Commercial Importance in Southern Brazil), Carpas Technical Paper No. 1, processed in Spanish, 1964. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

BREAM:

Preliminary Studies on Life History of Threadfin Bream (NEMIPTERUS HEXODON) in the Gulf of Thailand, by A. P. Isarankura and Suchart Pariyanond, Contri-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

bution No. 1, 28 pp., printed in Thai and English, 1963. Department of Fisheries, Bangkok, Thailand.

CANADA:

Canada's Pacific Marine Fisheries; Past Performance and Future Prospects, by P. A. Larkin and W. E. Ricker, 75 pp., printed, 1964. (Reprinted from Fifteenth British Columbia Natural Resources Conference, 1964.) Department of Natural Resources of British Columbia, Victoria, B. C., Canada.

Canadian Fisheries Reports, no. 3, May 1964, 109 pp., illus., printed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada. This issue is made up entirely of background papers prepared for a Federal-Provincial Conference on Fisheries Development, held in Ottawa, January 20-24, 1964. The purpose of the papers was to give an indication of the current situation in Canada in several aspects of the management, use, and development of the fishery resources. Includes, among others, articles on: "Availability of fish," by G. F. M. Smith and W. E. Ricker; "Population management," by G. F. M. Smith and A. L. Pritchard; "Development of improved fishing techniques," by Jean Frechet; "Economic efficiency," by W. C. MacKenzie; "Research on quality, processing and products," by E. G. Bligh; "Inspection and quality control," by H. V. Dempsey; "Improvement of shore facilities," by W. E. Snaith; "The market for Canadian fish products," by Antonin Proulx; and "Financial aspects of development," by I. S. McArthur.

Commercial Fishing at Ile a la Crosse (a Survey of Returns and Expenses), by Helen Buckley, 14 pp., printed, 1962. Centre for Community Studies, University Campus, Saskatoon, Sask., Canada.

Commercial Fishing Licence Report, British Columbia, 1963, 5 pp., printed, 1964. Canadian Department of Fisheries, Vancouver, B. C., Canada.

Fisheries Statistics, Quebec, 1962, 36 pp., illus., printed in French and English, 75 Canadian cents. Queen's Printer and Controller of Stationery, Ottawa, Canada, July 1964. Consists of tables giving the quantity and value of the principal species of fish and shellfish landed in Quebec, 1950-1962; quantity and value of landings by species and fisheries districts; quantity and value of processed fishery products by species; capital investment in gear and vessels; and number of fishermen employed, by fisheries districts; during 1961-1962.

Journal of the Fisheries Research Board of Canada, vol. 21, no. 4, July 1964, 210 pp., illus., printed, single copy C$2. Queen's Printer, Ottawa, Canada. Contains, among others, articles on: "Abundance and distribution of lobster larvae (Homarus americanus) in Northumberland Strait," by D. J. Scarratt; "Serologically differentiated subpopulations of the Pacific sardine, Sardinops caerulea," by Andrew M. Vrooman; "Extractives of fish muscle. 4--Seasonal variations of fat, water-solubles, protein, and water in cod (Gadus morhua L.) fillets," by N. Dambergs; "A technique for prolonged blood sampling in free-swimming salmon," by Lynwood S. Smith and Gordon R. Bell; "Temperatures and thaw-drip associated with electronic thawing of Newfoundland cod," by W. A. MacCallum; "Vital statistics of Esox masquinongy in Nogies Creek, Ontario. II--Population size, natural mortality, and the effect of fishing," by Barry S. Muir; "Use of gamma radiation for the preservation of scallop meat," by H. E. Power and others; "Gamma irradiation as a means of extending the storage life of haddock fillets," by H. E. Power and others; "Movements of halibut on the Nova Scotian and Grand Banks," by A. C. Kohler; "Pilchard oil: an analysis for component fatty acids with particular reference to the C_{24} chain length," by R. G. Ackman and J. C. Sipos; "An air-lift pump for elevating salmon, herring, and other fish of similar size," by S. W. Roach, F. G. Claggett, and J. S. M. Harrison; "Rockfish (Sebastodes brevispinis) in British Columbia waters," by S. J. Westrheim; and "Apparent onset of rigor mortis in steehead trout (Salmo gairdneri) in the absence of loss of adenosine triphosphate from the ordinary muscle," by N. Tomlinson, S. E. Geiger, and W. W. Kay.

Les Poissons du Quebec (Fishes of Quebec), by E. Juchereau Duchesnay, 47 pp., illus., printed in French, 1964. Les Editions de l'Homme, Montreal, Que., Canada.

Rapport Annuel, 1963 (Annual Report, 1963), 136 pp., printed in French, 1964. Station de Biologie Marine, Ministere de l'Industrie et du Commerce, Grande-Riviere, Que., Canada.

"The research program. Progress in 1961 in Canadian research on problems raised by the Protocol," article, Annual Report for 1961, pp. 29-47, printed, 1963. International North Pacific Fisheries Commission, 6640 NW. Marine Dr., Vancouver 8, B. C., Canada.

Summary of 1963 Fishing Operations, North Shore Fleet, New Brunswick (Preliminary Report), 6 pp., processed, May 1964. Economics Service, Department of Fisheries, Sir Charles Tupper Bldg., Ottawa, Canada. Contains statistical tables giving a summary of fishing activities and financial outcome; average landings by species; average landed value by species; average prices received by species; and average receipts, expenditures, and net returns for New Brunswick's North Shore fleet.

Summary of 1963 Fishing Operations, Nova Scotia (Preliminary Report), 16 pp., processed, April 1964. Economics Service, Department of Fisheries, Sir Charles Tupper Bldg., Ottawa, Canada. Discusses briefly the types of vessels covered in the report, characteristics of the vessels, their operational performance, and financial returns to labor and capital. Includes statistical tables giving summaries of fishing activities and financial outcome for 45-64-foot vessels, and for scallop draggers and otter trawlers; average landings by species; average landed values by species; average prices received by species; average receipts, expenditures, and net returns for 45- to 65-foot vessels, and for scallop draggers and otter trawlers; and percentage distribution of catches by fishing grounds.

Working Paper on the Commercial Fishing Industry in Northern Saskatchewan (with Particular Reference to Government Policy), by Helen Buckley, 23 pp., printed, 1963. Centre for Community Studies, University Campus, Saskatoon, Sask., Canada.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

CARP:

"Pro khimichnyi sklad krovi deyakykh ryb (korop, sazan)" (The chemical composition of the blood of some fish--carp, sazan), by I. D. Holovatskyi, B. S. Avdos'yev, and Z. P. Nazardevych, article, Biological Abstracts, vol. 44, no. 4, 1963, 14267, printed. Biological Abstracts, 3815 Walnut St., Philadelphia 4, Pa.

CEYLON:

"Partial Survey and Critique of Ceylon's marine fisheries," by J. C. Medcof, article, Bulletin of the Fisheries Research Station of Ceylon, vol. 16, no. 2, 1963, pp. 29-118, printed. Department of Fisheries, P. O. Box 531, Galle Face, Colombo 3, Ceylon.

Report on the Fishery of Ceylon and the Possibilities of Development under Special Consideration of the Construction of Fishing Ports in Galle and Trincomalee, by Klaus Tiews and K. Minnemann, Sessional Paper No. XX-1963, 55 pp., illus., printed, 1963. Government Press, Colombo, Ceylon.

CHILE:

Montemar, vol. 11, no. 4, March 1964, 64 pp., illus., printed in Spanish with English summaries. Instituto de Biologia, Estacion de Biologia Marina, Universidad de Chile, Casilla 13-D, Vina del Mar, Chile. Includes articles on: "Resultados cuantitativos del zooplancton colectado frente a la costa chilena por la Expedicion 'Marchile I'" (Quantitative results of Zooplankton collected along the Chilean coast by the "Marchile" Expedition), by Elda Fagetti G. and Walter Fischer K.; and "Nota sobre larvas de Brachiopoda Discinidae de la costa chilena" (Note on the larvae of the Brachiopod Discinidae of the Chilean coast), by Elda Fagetti G.

CLAMS:

The Fishing Efficiency of the Clam Hack and Mortalities Incidental to Fishing, by J. S. MacPhail, Manuscript Report Series (Biological) No. 784, 15 pp., printed, 1964. Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada.

Sanitary Engineering Conference, 2d, Vanderbilt University, 1963--Effects of an Introduced Clam (CORBICULA) on Water Quality in the Tennessee River Valley, by Ralph M. Sinclair, 12 pp., illus., printed. Vanderbilt University, Nashville, Tenn.

COD:

"Eksperimental'nye issledovaniya vozmozhnosti vizhivaniya ikry i molodi Baltiiskoi treski (Gadus morhua callarias L.) v Chernomorskoi vode" (Experiments on the viability of eggs and young of Baltic cod--Gadus morhua callarias L.--in Black Sea waters), by N. N. Gorbunova, article, Voprosy Ikhtiologii, vol. 3, no. 2, 1963, pp. 411-413, illus., printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U. S. S. R.

"New cod fishing grounds off Labrador and the northeast coast of Newfoundland," by A. W. May, article, Trade News, vol. 16, no. 12, June 1964, pp. 3-6, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada. Discusses the growth since the early 1950's of a year-round cod fishery at the edge of the continental shelf about 150 miles from the Canadian Atlantic coast. During 1960-62, almost one million metric tons of cod were landed in that area. The Canadian Government's research vessel A. T. Cameron has conducted 13 exploratory cruises in the area. "It is apparent that lucrative fishing is to be found on these northern grounds in spring, but it depends almost entirely on ice conditions," concludes the author.

CONTAINERS:

"Corrosive conditions of coated tin cans containing sterilized canned fish in acidic sauces," by G. Wunsche, article, Tidsskrift for Hermetikindustri, vol. 49, 1963, p. 29, printed in Norwegian. Norske Hermetikfabrikers Landsforening, Stavanger, Norway.

Influence of Type of Freezer Carton Materials on Moisture Loss from Frozen Fish during Storage, by J. W. Boyd, B. A. Southcott, and D. Petrie, Circular No. 31, 8 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Vancouver, B. C., Canada.

Non-Returnable Fish Boxes, by J. Wignall, Torry Advisory Note No. 16, 5 pp., printed, 1964. Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

COOPERATIVES:

Technical Meeting on Fishery Cooperatives, Naples, 1959--Fishermen's Cooperative Fraternity - San Sebastian (Guipuzcoa) Spain - C. O. P. E. G. U. I. (An Industrial Cooperative for the Defense of Fish Prices, Based on Market Control and Disposal of Surplus), by L. Echeverria and J. A. Urquizu, 10 pp., printed, 1959. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

CORAL:

"Deep water corals as fish food," by Donald F. Squires, article, Nature, vol. 203, no. 4945, August 8, 1964, pp. 663-664, illus., printed, single copy 4s. (about 55 U. S. cents). St. Martin's Press, Inc., 175 Fifth Ave., New York, N. Y. 10010.

CRABS:

Experiment to Evaluate the Effect of Subsurface Explosions on Bottom Dwelling King Crabs, by Donald Bright, 4 pp., printed, 1959. Department of Fish and Game, Subport Bldg., Juneau, Alaska.

CYPRUS:

"The development of the Cyprus fishery resources," by Andreas Keleskis, article, Countryman, vol. 1/2, 1963, pp. 12-13, illus., printed. Public Information Office, Department of Agriculture, Nicosia, Cyprus.

"The possibilities of culturing fish in various reservoirs around Cyprus," by A. Keleshis, article, Countryman, vol. 1/2, 1963, pp. 23-24, illus., printed. Public Information Office, Department of Agriculture, Nicosia, Cyprus.

DATA PROCESSING:

Automatic Data Processing and Computer Application to Fisheries, by B. F. Leeper, 12 pp., processed in English with French and Spanish abstract. UNIVAC Division of Sperry-Rand Corporation, Baton Rouge, La. Paper presented at the Second World Fishing Gear Congress, London, May 25-31, 1963.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

DENMARK:

Denmark Review, Special Edition: Danish Fishery and Fishery Exports, 11 pp., illus., printed. Press Department, Royal Danish Ministry for Foreign Affairs, Christiansborg, Copenhagen, Denmark. Featured is an article on the 5th International Fisheries Trade Fair held in Copenhagen, September 11-20, 1964. Other articles describe Danish salmon and trout; the Danish fishing industry, export trade, vessels, and fish-processing plants; the Greenland fishery; and Danish canned fish.

DETECTION OF FISH:

Studies for Development of Echo Sounder, Vertical and Horizontal Fish Finder, Utilizing Ultra-Sonic mm. Waves, by Y. Maniwa, Scientific Report No. 4, 137 pp., illus., printed in Japanese with English summary. Fishing Boat Laboratory, Fisheries Agency, Tokyo, Japan, 1962.

DOLPHIN:

"Cross-sectional anatomy of the dolphin," by Robert C. Boice, Mary Louise Swift, and James C. Roberts, Jr., article, Norsk Hvalfangst-Tidende (The Norwegian Whaling Gazette), vol. 53, no. 7, July 1964, pp. 177-182, 184, 186, 188-93, illus., printed. Hvalfangerforeningen, Sandefjord, Norway.

DOMINICAN REPUBLIC:

Basic Data on the Economy of the Dominican Republic, by Alfred Ortiz, OBR 64-80, 24 pp., illus., printed, June 1964, 15 cents. Bureau of Foreign Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Discusses the country's geography, population, and Government; economic structure; industrial sectors; financial institutions; foreign trade; Government role in the economy; and economic outlook. Also includes several statistical tables on industrial and agricultural production, foreign trade, and other data.

EAST AFRICA:

East African Freshwater Fisheries Research Organization, Annual Report, 1962/63, 78 pp., illus., printed, 1964, 6s. (about 85 U. S. cents). East African Freshwater Fisheries Research Organization, P. O. Box 343, Jinja, Uganda. Describes the scientific work accomplished during 1962 and 1963 in the study of the Lake Victoria fisheries, the Nile perch in Lake Victoria, ecology and productivity of young tilapia, and anadromous fish. Also includes a bibliography of recent publications on East African fisheries and related subjects, and appendices of research papers on fisheries.

EAST CHINA AND YELLOW SEAS:

Conservation of Demersal Fish Resources in the East China and the Yellow Seas, by Shiro Murakami and others, Fisheries Research Series No. 3, 60 pp., illus., printed in Japanese, June 25, 1964. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

ECHO-SOUNDERS:

The Uses of Echo Sounding for Fishermen, by D. H. Cushing, 28 pp., illus., printed, 1963. Ministry of Agriculture, Fisheries and Food, London, England. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.)

ECOLOGY:

The following articles were published under the general heading, "The effects of the severe winter of 1962/63 on marine life in Britain," in Journal of Animal Ecology, vol. 33, no. 1, 1964, printed. Blackwell Scientific Publications, 24 Broad St., Oxford, England.

"The death of fish and sub-littoral fauna in the North Sea and the English Channel during the winter of 1962-63," by P. M. J. Woodhead, pp. 169-173, illus.

"The effect of the severe winter of 1962/63 on oysters and the associated fauna of oyster grounds of southern England," by G. D. Waugh, pp. 173-175.

"The north-east coast," by H. Jenner, J. R. Lewis, and J. J. S. Cobb, p. 200.

"Fish mortality off the Isle of Man and in the Port Erin aquarium," by J. S. Colman, p. 173.

"Mortalities in marine life in North Wales during the winter of 1962-63," by D. J. Crisp, pp. 190-197, illus.

"North-west Ireland," by D. J. Crisp, pp. 197-198.

"The south-east coast, Whitstable area," by G. E. Newell, pp. 178-179.

"South and south-west coast," by D. J. Crisp, pp. 179-183, illus.

"West of Ireland," by M. de Valera and P. O. Ceidigh, pp. 198-199.

ECUADOR:

"Apuntes e informaciones sobre la situation de la produccion pesquera Ecuatoriana y sus mercados" (Memoranda and information on the production situation of the Ecuadorian fishery and its markets), by Domingo Quiroga and Anibal Orbes Armas, article, Boletin Informativo, vol. 1, no. 3, 1964, pp. 1-24, printed in Spanish. Instituto Nacional de Pesca del Ecuador, Casilla 5918, Guayaquil, Ecuador.

Basic Data on the Economy of Ecuador, by Mildred P. Burr, OBR 64-74, 12 pp., illus., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Her participation in the Alliance for Progress and the implementation of a 10-year national economic development plan are important factors in Ecuador's efforts to raise her standard of living. The report discusses her geography, climate, population, and Government; structure of the economy; industrial sectors; labor force; financial organization; foreign trade; and the role of the Government in the economy. A short section on fisheries covers the shrimp fishing grounds near Manta, Ecuador's 1962 exports of more than $2 million worth of fishery products, and her claims of territorial jurisdiction over waters extending 200 miles from the coast.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

EELS:

"The Australian eel industry," by D. D. Lynch, article, Commercial Fishing, vol. 2, no. 11, July 1964, pp. 22-24, 26, illus., printed. Trade Publications Ltd., 47 Lewis Eady Bldg., 192 Queen St., Auckland, New Zealand. Discusses the use of fyke nets for capturing eels in the swamps and lagoons of the State of Victoria. Also covers the increase in production since the inception of the fishery in 1955 to about 110,000 pounds annually; grading of the eels after capture; removal of slime; evisceration; the smoking process; and packing for market.

"Eel weir fishing," by Don Shiner, article, Pennsylvania Angler, vol. 33, no. 9, September 1964, pp. 2-5, illus., printed, single copy 25 cents. Pennsylvania Fish Commission, South Office Bldg., Harrisburg, Pa. Discusses the construction and operation of the traps for this fast-disappearing method of capturing eels as they migrate down the Delaware River each fall to spawn in the Atlantic Ocean. The traps consist of stone walls 300-400 feet long and 6 to 8 feet high, together with baskets of wooden slats. The migration begins after the first hard frost during the dark of the moon, and continues for about two weeks. Properly prepared, eels are one of the finest eating fish in fresh water.

A Guide to Pond Culture of the Eel, by Isao Matsui, Fisheries Propagation Series No. 4, 116 pp., illus., printed in Japanese, March 21, 1964. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

EQUATORIAL CUSTOMS UNION AND CAMEROON:

Foreign Trade Regulations of the Equatorial Customs Union (Central African Republic, Republics of Chad, Congo, Gabon) and Cameroon, by Alfred F. Daiboch, OBR 64-98, 12 pp., printed, September 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) The four component states of former French Equatorial Africa--Central African Republic, and the Republics of Congo-Brazzaville, Chad, and Gabon--which together constitute the Equatorial Customs Union, and the Federal Republic of Cameroon now have a common external tariff. The report discusses their trade policy, import tariff system, sales and other internal taxes, documentation and fees, and labeling and marking requirements. It also covers special customs provisions, nontariff import controls, export controls, United States foreign trade controls, and Government representation between the United States and the five countries.

EUROPEAN FREE TRADE ASSOCIATION:

EFTA (European Free Trade Association)--What It is--What It Does, 8 pp., illus., printed. Washington Information Office, European Free Trade Association, 711 14th St. NW., Washington, D. C. 20005. EFTA united in a free trade area the 97 million people and the markets of 8 European countries which are among the world's most active trading nations. This pamphlet discusses trade without barriers, outward-looking policies, how EFTA came about, the removal of tariffs and quotas, other obstacles to trade, economic development, agriculture and fish, the growth of EFTA trade, EFTA and the world, and how EFTA works.

The Operation of a Free Trade Area, by Torben Jantzen, 24 pp., illus., printed, 1964. Washington Information Office, European Free Trade Association, 711 14th St. NW., Washington, D. C. 20005. The European Free Trade Association is an arrangement between 8 countries (the original 7 members: Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom; and the associated member, Finland) to create a single market by the abolition of tariffs and all other restrictions on the flow of trade between the members, while leaving them free to maintain their own and to follow their own commercial policies concerning third countries. This pamphlet discusses how EFTA started, the EFTA Convention, and its first years. It also covers the operation of EFTA--tariff reductions, the need of an origin system, the 50-percent rule, the process criterion, revenue duties, internal taxes, quantitative import restrictions, rules of competition, double taxation, economic development, EFTA and trade in agriculture, organizational structure, and consultations and complaints. A short section on EFTA and trade in fish states that the main problem facing the fishery nations among the membership is the continuation of access at a satisfactory level to the market of the EEC countries.

FACTORYSHIP:

"Doświadczenia z eksploatacji trawlera-przetwórni na lowiskach afrykańskich" (Experiences gained from operation of a factory-trawler on African fishing grounds); "__________. Czesc II" (Part II); by Jerzy Swiecicki and Zbigniew Tretkowski, articles, Budownictwo Okretowe, vol. 9, no. 7, July 1964, pp. 251, 254-255; vol. 9, no. 8, August 1964, pp. 286-288; illus., printed in Polish. Wydawnictwa Czasopism Technicznych NOT, Warsaw Czackiego 3/5, Poland.

FATTY ACIDS:

The Lipids of Marine Organisms, by J. A. Lovern, Torry Memoir No. 168, 23 pp., printed. (Reprinted from Oceanography and Marine Biology Annual Review, vol. 2, 1964, pp. 169-191.) Torry Research Station, 135 Abbey St., Aberdeen, Scotland.

FISH BEHAVIOR:

On Fish Behaviour in the Zone before a Trawl under the Influence of the Electric Field of an Alternating Current and Mechanical Stimulus, by V. A. Shentyakov, Translation 34, 5 pp., printed, 1964. (Translated from the Russian, Biulletin' Instituta Biologii Vodokhranilishch, no. 8-9, 1960.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

"Further uses of electronically scanned sonar in the investigation of behaviour of fish," by V. G. Welsby and others, article, Nature, vol. 203, no. 4945, August 8, 1964, pp. 588-589, illus., printed, single copy 4s. (about 55 U. S. cents). St. Martin's Press, Inc., 175 Fifth Ave., New York, N. Y. 10010.

Reaction of Fish to the Action of Electric Current, by N. V. Bodrova and B. V. Krayukhin, U. S. Library of Congress Translation No. 4897 (OTS No. 61-13957),

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

15 pp., original text included, printed, $3.30. (Translated from the Russian Trudy Soveshchanii, no. 8, 1958, pp. 124-131.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230, 1960.

"The reaction of fish to light in relation to specific characteristics of their light perception," by V. R. Protasov, article, Voprosy Ikhtiologii, vol. 1, no. 3, 1961, pp. 519-532, printed in Russian. Akademia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U. S. S. R.

"Why light attracts fish," by V. N. Beliaeva and I. V. Nikonorov, article, Voprosy Ikhtiologii, vol. 1, no. 3, 1961, pp. 513-518, printed in Russian. Akademia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U. S. S. R.

FISH COOKERY:

All About Fish--a Manual for Teachers, 32 pp., Illus., processed, 1963, C$24.35 per 100 copies. Queen's Printer, Ottawa, Canada. Discusses briefly Canada's fisheries and the Government's role in conservation and development, common varieties of fish for sale in Canada, marketing and distribution, consumer buying, care of fish in the home, fish as a food, and fish on the menu. Also included is information on preparation for cooking, basic methods of cooking fish, and miscellaneous fish recipes.

Fish for Year 'Round Salads, 24 pp., printed, 1962, C$6.50 per 100 copies. Queen's Printer, Ottawa, Canada. Fish is available in many different forms; canned, smoked, fresh, frozen, and pickled. Any of the wide variety of fresh and salt-water fish, as well as shellfish, may be used in salads. This booklet includes, besides instructions for cooking fish for salads, a number of recipes for preparing tossed, combination, mixed, fish and fruit, and molded salads, as well as salad dressings.

Halibut Recipes, 34 pp., processed, 10 cents. Halibut Fishermen's Wives' Association, P. O. Box No. 5129, Seattle, Wash. 98107. Contains recipes for halibut casseroles, chowder, sandwiches, salads, and for cooking halibut by frying, broiling, or baking. Also includes recipes for sauces and stuffing to serve with halibut. Information on thawing, amounts of fish to buy, and minimizing fish odors and flavors in the kitchen is presented.

Let's Serve Freshwater Fish, 32 pp., illus., printed, 1963, C$6.50 per 100 copies. Queen's Printer, Ottawa, Canada. Discusses the variety of Canadian fresh-water fish available, Government inspection of fish, nutritional advantages of fish, and how to know when fish is cooked sufficiently. Includes a number of recipes for preparing all species of freshwater fish, as well as others for cooking goldeye, perch, pickerel, pike, Atlantic salmon, smelt, trout, and whitefish. Other sections give instructions on making sauces and fish salads. Tips are given on keeping fish fresh and freezing fish.

Le Poisson dans la Cuisine Canadienne (The Canadian Fish Cook Book), 96 pp., illus., printed in French, 1959, C$1.25; 97 pp., illus, printed in English, 1962, C$1.25. Queen's Printer, Ottawa, Canada.

A Propos de Poisson--Manuel pour Instituteurs (All About Fish--Manual for Teachers), 32 pp., illus., processed, 1961, C$24.35 per 100 copies. Queen's Printer, Ottawa, Canada.

Salades de Poisson pour Toute l'Annee (Fish for year 'Round Salads), 26 pp., printed in French, 1962, C$4.85 per 100 copies. Queen's Printer, Ottawa, Canada.

Servons du Poissons d'Eau Douce (Let's Serve Freshwater Fish), 35 pp., illus., printed in French, C$6.50 per 100 copies. Queen's Printer, Ottawa, Canada.

FISH CULTURE:

"Marine fish culture in Britain. I--Plaice rearing in closed circulation at Lowestoft, 1957-1960," by J. E. Shelbourne, J. D. Riley, and G. T. Thacker; "II--A plaice rearing experiment at Port Erin, Isle of Man, during 1960, in open sea water circulation," by J. E. Shelbourne; and "III--Plaice rearing in closed circulation at Lowestoft 1961," by J. D. Riley and G. T. Thacker, article, Journal du Conseil, no. 28, 1963, pp. 50-90, printed. Conseil Permanent International pour l'Exploration de la Mer, Charlottenlund Slot, Denmark.

FISH DISEASES:

Proceedings of the Conference on Fish Diseases, 236 pp., illus., printed, 1963. (Translated from the Russian, Akademiya Nauk SSSR Ikhtiologicheskaya Komissiya Trudy Soveshchanii, vol. 9, 1957.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

FISHERIES POLICY:

"Hacia una politica paneuropea de las pescas" (Toward a paneuropean fisheries policy), by Leopold Sublin, article, Industrias Pesqueras, vol. 38, nos. 889-890, May 15, 1964, pp. 185, 187, 189, printed in Spanish. Industrias Pesqueras, Policarpo Sanz, 21-2, Vigo, Spain.

"The London Fisheries Convention and its origins," by R. G. R. Wall, article, Fishing News International, vol. 3, no. 3, July-September 1964, pp. 198-205, illus., printed, single copy 6s. 6d. (about 95 U. S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England. Outlines the historical and political background of the London Fisheries Convention, adopted early in 1964 by delegations from Austria, Belgium, Denmark, France, the Federal Republic of Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom and Northern Ireland. Also included is the full text of the Convention, which embodies 4 basic principles: (1) that extensions of fishery limits should be made by agreement; (2) that traditional fishing activities by foreign fishermen should be respected; (3) that proper consideration should be given to the needs of local populations which are overwhelmingly dependent upon the fisheries; and (4) that fishery limits and jurisdiction should in no circumstances extend beyond 12 miles.

"The North American fisheries and British policy to 1713," by Charles Burnet Judah, article, University of Illinois Bulletin, vol. 31, no. 1, 1933, 183 pp., printed. University of Illinois, Urbana, Ill.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

FISHERY RESOURCES:

Organization and Management of Research on Marine Fish Resources, by G. R. Williams, FAO Fisheries Technical Paper No. 43, 29 pp., processed, May 1964, distribution restricted. Research Programs Section, Biology Branch, Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. Fishery resources may be defined in one of two ways: (1) in a restrictive sense, to denote a fishable stock, or group of stocks, which may or may not yet be exploited; and (2) in a very broad sense, to denote a community or ecosystem, that is a system the elements of which include not only the species being harvested but also those on which they feed or which influence their lives; it also denotes the physical and chemical components that influence the lives of the several species. Most fishery research programs today are concerned mainly with the tasks relating to resources restrictively defined. This paper is based upon the author's experiences in resource research in Australia. It covers the subject under five main headings--policy direction, research plan, operational procedures and controls, reporting results, and structure of the research organization. Included is an operational plan for a survey of shrimp resources of the Gulf of Carpentaria, Australia.

FISH FARMING:

"Fish farming," by Ian Richardson, article, World Fishing, vol. 13, no. 9, September 1964, pp. 41-46, illus., printed, single copy 3s. (about 45 U. S. cents). Grampian Press Ltd., The Tower, 229-243 Shepherds Bush Rd., Hammersmith, London W6, England. A survey of fish farming methods in various countries, including the culture of yellowtail and shrimp in Japan; carp and pike on a 12,355 acre farm in the Ukraine; cod, perch, and catfish in Australia; carp in Syria; and salmon and trout in the United Kingdom and Norway. Each enterprise was able to produce outstanding yields of fish by the use of selective breeding and proper feeding.

FISH FOOD:

Food of Perch (PERCA FLUVIATILIS, L.) and Trout (SALMO TRUTTA, L.) in an Irish Reservoir, by Christopher Moriarty, Proceedings of the Royal Irish Academy, vol. 63, sect. B, no. 1, 31 pp., illus., printed, 1963. Hodges, Figgis & Co., Ltd., Dublin, Ireland.

FISHING LIMITS:

Comments on the 12-Mile Limit, by William F. Royce, Circular No. 215, 3 pp., printed, 1964. Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, Wash.

FISH MEAL:

Available Methionine and Available Lysine in Fish Meal, by S. G. Wiechers and R. M. Bechard, Progress Report No. 72, 3 pp., processed, July 1964. Fishing Industry Research Institute, University of Cape Town, Rondebosch, Cape Province, Republic of South Africa.

Bulk Handling of B. C. Whole Herring Meal, by F. G. Claggett, Circular No. 32, 7 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Vancouver, B. C., Canada.

"Pepsin digestibility as an index of quality in fish. Part I--General considerations," by J. A. Lovern, article, Fishing News International, vol. 3, no. 3, July-September 1964, pp. 206, 209-210, 212-213, illus., printed, single copy 6s. 6d. (about 95 U. S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England. Discusses the methods of measuring protein availability, the growing trend towards international standardization of analytical procedures, principles of the pepsin test, and the reliability of pepsin digestibility as an index of quality. Included are findings of research on pepsin digestibility of proteins conducted at the U. S. Bureau of Commercial Fisheries' Technological Laboratory, College Park, Md.

Recommendations for the Warehousing of Fish Meal, by G. M. Dreosti, R. J. Nachenius, and L. L. van Zyl, Memorandum No. 137, 4 pp., illus., processed, August 1964. Fishing Industry Research Institute, University of Cape Town, Rondebosch, Cape Province, Republic of South Africa.

Salmonella Contamination of Fish Meal, by G. M. Dreosti, Apply Your Science No. 11, 1 p., printed, 1964. Fishing Industry Research Institute, University of Cape Town, Rondebosch, Cape Province, Republic of South Africa.

Shipboard Stowage of Fish Meal, by G. M. Dreosti, Memorandum No. 135, 5 pp., printed, 1964. Fishing Industry Research Institute, University of Cape Town, Rondebosch, Cape Province, Republic of South Africa.

FISH MORTALITIES:

Regarding the Problem of Mutilations of Fishes by Hydraulic Turbines, by Kurt V. Raben, Translation Series No. 448, 11 pp., printed, 1964. (Translated from the German, Die Wasserwirtshaft, no. 4, 1957.) Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

"Studies on fish mortality due to passage through turbines; preliminary report," by Erik Monten, article, Report No. 45, pp. 190-195, printed. Institute of Freshwater Research, Fishery Board of Sweden, Drottingholm, Lund, Sweden.

FISH PONDS:

Study on the Construction Works of Fish Pond from Civil Engineering Viewpoint, by T. Tamura and S. Yamada, Fisheries Propagation Series No. 1, 32 pp., illus., printed in Japanese, December 10, 1963. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

FISH POPULATIONS:

"Changes in the fish population in the upper Ohio River following temporary pollution abatement," by Louis A. Krumholz, article, Transactions of the American Fisheries Society, vol. 93, no. 1, 1964, pp. 1-5, printed. American Fisheries Society, 1404 New York Ave. NW., Washington, D. C. 20005.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Notes on the Identification of Sub-Populations of Fish by Serological and Biochemical Methods, the Status of Techniques and Problems of Their Future Application, by B. B. Parrish, Fisheries Biology Technical Paper No. 30, 9 pp., processed, 1964. Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme Caracalla, Rome, Italy.

FISH PROTEIN CONCENTRATE:

"Fish flour in human nutrition," by P. Nunes, article, Gazeta Agricola de Angola, vol. 8, no. 4, October 1963, pp. 995-998, printed in Portuguese. Gazeta Agricola de Angola, Luanda, Angola.

A Report to the Fishing Industry on the Characteristics of Fish Protein Concentrates Made from Various Raw Materials, by H. E. Power, Circular (New Series) No. 15, 2 pp., printed. Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada.

FISH SAUSAGE:

"More about fish sausages," article, World Fishing, vol. 13, no. 9, September 1964, p. 51, illus., printed, single copy 3s. (about 45 U. S. cents). Grampian Press Ltd., The Tower, 229-243 Shepherds Bush Rd., Hammersmith, London W6, England. Japan's annual production of 150,000 tons of fish sausages and 500,000 tons of fish cakes is an indication of the growing demand for prepared foods. Fish sausages are made of minced cod or pollock and tuna and whalemeat, with potato or corn starch, flavorings, and sodium glutimate added. Packed in skins, the final product has a firm texture and a pleasing flavor.

FISH SOUNDS:

"Deep ocean sonic fishes," by N. B. Marshall, article, Oceanus, vol. 11, no. 1, September 1964, pp. 2-7, printed. The Woods Hole Oceanographic Institution, Woods Hole, Mass.

FLORIDA:

Bibliography on Fresh-Water Biology in Florida, by James P. Clugston, 23 pp., printed, 1964. Game and Fresh Water Fish Commission, Leesburg, Fla.

FLOUNDER:

"Feeding habits of the summer flounder in Great South Bay," by John C. Poole, article, New York Fish and Game Journal, vol. 11, no. 1, 1964, pp. 28-34, printed. New York Fish and Game Journal, New York Conservation Department, Albany, N. Y.

FOOD AND AGRICULTURE ORGANIZATION:

"Co-ordinating fishery development for world needs," by Arthur J. Heighway, article, Fishing News International, vol. 3, no. 3, July-September 1964, pp. 193-194, 197, illus., printed, single copy 6s. 6d. (about 95 U. S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England. Discusses proposals of the Food and Agriculture Organization of the United Nations (FAO) for reorganizing the structure and functions of its Fisheries Division to meet expanded world needs. The basic aim of FAO is to improve nutrition, the well-being of rural populations, and the promotion of economic development. In fisheries, this is of special significance at this time. The gravest problem in nutrition is lack of high-quality protein, for which seas and inland waters have an enormous unrealized potential. The changes that have already taken place are quite dramatic and revolutionary. World fish production has doubled over the past decade. There have been improvements in gear and vessels, growth of marketing organization, and refinements and innovations in processing techniques. Plans for improved services by FAO should evolve following a forthcoming meeting of the Council.

FAO, Functions, Structure, Program--a Briefing Manual for Field Personnel, 32 pp., printed, 1964. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Informe de la Primera Reunion de la Comision Asesora Regional de Pesca para el Atlantica Sudoccidental (CARPAS), 10-14 de Diciembre de 1962, Rio de Janeiro (Report of the First Meeting of the South West Atlantic Fisheries Advisory Commission (SWAFAC), December 1962, Rio de Janeiro), FAO Fisheries Report No. 12, 56 pp., processed in Spanish, 1963. Comision Asesora Regional de Pesca para el Atlantico Sudoccidental, Rua do Jardim Botanico 1008, Rio de Janeiro, Brazil.

Report of the World Food Congress, Washington, D.C., 4 to 18 June 1963, 167 pp., printed, 1963, $3. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by Columbia University Press, International Documents Service, 2960 Boradway, New York, N. Y. 10027.)

The Food and Agriculture Organization has published reports describing that Agency's activities under the Expanded Program for Technical Assistance for developing the fisheries of many countries. These reports have been processed only for limited distribution to governments, libraries, and universities. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Report on a Fishermen's Training Center in Construction and Operation of Modern Fishing Gear, Held at Tulagi, British Solomon Islands Protectorate, August-October 1961, by P. A. Lusyne, ETAP Report No. 1657, 12 pp., processed, 1963.

Report to the Government of the Federation of Rhodesia and Nyasaland on Fisheries Development Possibilities in Nyasaland, by M. Aref, ETAP Report No. 1761, 44 pp., processed, 1963.

Report to the Government of Tanganyika on Economic Survey of Marine and Inland Fisheries, by J. L. Dibbs, ETAP Report No. 1828, 59 pp., processed, 1964.

Rapport au Gouvernement de la Tunisie la Prospection Systematique des Fonds de Peche au Large des Cotes Tunisiennes (Report to the Government of Tunisia on the Systematic Exploration of the Bottoms for Fish along the Tunisian Coasts), by Vito Fodera, ETAP Report No. 1836, 68 pp., illus., processed, 1964.

FOREIGN AID:

Aids to Business (Overseas Investment), 59 pp., printed, July 1964. Office of Development Finance and Private Enterprise, Agency for International Development, U. S. Department of State, Washington, D. C.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

20523. Describes the programs sponsored by AID to assist businessmen with overseas investments--catalog of investment opportunities, investment surveys, investment guarantees, local currency loans, and dollar loans.

Index to Catalog of Investment Opportunities, 37 pp., printed, revised July 1964. Office of Development Finance and Private Enterprise, Agency for International Development, U. S. Department of State, Washington, D. C. 20523. Abstracts more than 1,400 industrial feasibility and economic studies in friendly developing nations. The first part indexes reports by region and country; the second indexes reports by industry. Included are a group of reports concerning fresh or frozen packaged fish.

FRANCE:

"Compte rendu d'activite des Comites interprofessionnels des Peches maritimes en 1963" (Summary of the activities of the Fishery Committees of the Maritime Fisheries in 1963), article, France Peche, no. 86, July-August 1964, pp. 15-21, 23-24, 26-28, illus., printed in French. France Peche, Boite Postale 179, Lorient, France. Includes reports on the herring, tuna, sardine, mollusk, and seaweed fisheries.

FREEZE-DRYING:

"Astacene pigment loss occurring in freeze-dried shrimp and salmon during storage," by G. Lusk, M. Karel, and S. A. Goldblith, article, Food Technology, vol. 18, no. 5, 1964, pp. 157-158, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

"Rapid method for determining the moisture content of freeze-dried shrimp," by J. E. Despaul and D. W. Ezerski, article, Journal of the Association of Official Agricultural Chemists, vol. 46, 1963, p. 1001, printed. Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C. 20004.

FREEZER-TRAWLER:

B-23 and B-18 Types Freezing Trawlers, Polish Maritime News, Press Information, April 5, 1963, 6 pp., processed. Polish Chamber of Foreign Trade, Maritime Branch, Gdynia, ul. Pulaskiego 6, Poland.

FREEZING:

"Technology of fish products. Use of carbon dioxide in the storage of fish," by A. P. Makashev, article, Trudy Vsesoiuznyi Nauchno-issledovatel'skii Institut Morskogo Rybnogo Khoziaistva i Okeanografii, vol. 37, 1959, p. 138, printed in Russian. Institut Morskogo Rybnogo Khoziaistva i Okeanografii, Verkhn. Krasnosel'skaia Ul. No. 17, Moscow, U. S. S. R.

FROZEN FISH:

"Changes in the amount of nitrogenous extractives in frozen fish muscle during storage," by J. Nishimoto, article, Memoirs, Faculty of Fisheries, Kagoshima University, vol. 11, no. 2, 1962, pp. 152-157, illus., printed in Japanese with English summary. Faculty of Fisheries, Kagoshima University, Kagoshima, Japan.

"La experiencia de las importaciones de pescado congelado" (The experience of importing frozen fish), by Mareiro, article, Industrias Pesqueras, vol. 38, no. 892, June 15, 1964, pp. 294-295, printed in Spanish, single copy 50 ptas. (about 85 U. S. cents). Industrias Pesqueras, Policarpo Sanz, 21-2, Vigo, Spain.

"Identificacion de los cambios de calidad en el pescado congelado" (Identification of the changes in quality in frozen fish), by A. Banks, article, Revista del Frio, vol. 8, no. 4, October-December 1963, pp. 169-174, printed in Spanish with English summary. Centro Experimental del Frio, Serrano, 150, Madrid, Spain.

Interconversions of Flavorous Nucleotide Catabolites in Chilled and Frozen Fish, by N. R. Jones. Torry Research Station, Aberdeen, Scotland. Paper presented at XIth International Congress of Refrigeration, August 27-September 4, 1963, Munich, Germany.

"Vacuum-packed frozen fatty fish," by F. Bramsnaes and H. C. Sorensen, article, Bulletin, Institut International du Froid, Suppl. no. 3, pp. 281-288, printed. Institut International du Froid, 177 Boulevard Malesherbes, Paris 17, France.

GEAR:

"Collapsible cray or crab pot," by Alan Temple, article, Fisheries Newsletter, vol. 23, no. 7, July 1964, pp. 17, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, Australia. Describes a Japanese-manufactured crab or cray pot to be tested in Australia. Details of construction and performance are included. Advantages are the savings in storage space, and an increased catch rate achieved by the side entrance as compared to the top-entrance type pot.

"On the influence of hydrodynamic forces upon trawling warp and the choice of wire ropes for high-speed and deep-water trawling," by S. N. Chubarov, article, Rybnoe Khoziaistvo, vol. 38, no. 5, 1962, pp. 45-49, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U. S. S. R.

"Preliminary tests of automatic locks for otter boards," by V. K. Kondourov, article, Rybnoe Khoziaistvo, vol. 38, no. 12, 1962, pp. 41-43, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

Study of Midwater Trawl Fishing Gear and Their Telemeters, by C. Hamuro and K. Ishii, Scientific Report No. 3, 113 pp., illus., printed in Japanese. Fishing Boat Laboratory, Fisheries Agency, Tokyo, Japan, 1961.

GEAR SELECTIVITY:

"A note on the interim effects on catches of changes in gear selectivity," by J. A. Gulland, article, Journal du Conseil, vol. 29, no. 1, June 1964, pp. 61-64, illus., printed, single copy 16 kr. (about US$2.30). Andr. Fred. Host & Son, Bredgade, Copenhagen, Denmark. Discusses a method of predicting the effects, both long-range and short-term, of changes in selectivity (i. e. larger mesh size) on catch, using data on the size composition of the catches before a change in gear, the selectivity of the original and changed gears, and the ratio of fishing to total mortality.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Selection by codend meshes and hooks on cod, haddock, flatfish and redfish," by F. D. McCracken, article, Special Publication No. 5, pp. 131-155, printed, 1963. Bedford Institute of Oceanography, P. O. Box 638, Dartmouth, N. S., Canada.

GENERAL:

Farmer's World--The Yearbook of Agriculture, 1964, 607 pp., printed, 1964, $3. The U. S. Department of Agriculture, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.) A book primarily for and about the farmer and his crops but containing a chapter, "Fisheries of the world," by Sidney Shapiro, which points out the increasing importance of fish products to our available supplies of proteins. Discusses the principal marine fish and shellfish, the methods of capture, improved methods of processing, the chief fisheries nations, international trade, and fisheries treaties. Also touches briefly on United States programs for aid to domestic and foreign fisheries, work of the Fisheries Division of the Food and Agriculture Organization of the United Nations, other international organizations concerned with fisheries, and the two Conferences on Law of the Sea held in Geneva in 1958 and 1960. Other articles of interest to people in fisheries and allied fields are "World sources of protein," by Martin G. Weiss and Ruth M. Leverton; "The evolution of competitive markets," by Harry C. Trelogan; "Processing and preservation," by Robert L. Olson and Clyde L. Rasmussen; and "Problems in human nutrition," by Hazel K. Stiebeling and Ruth M. Leverton.

Fishing in the Future, by Dayton L. Alverson and J. Wilimovsky, Reprint No. 542, 5 pp., illus., printed. (Reprinted from Fisheries Newsletter, vol. 23, no. 4.) Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Research Organization, Cronulla, N. S. W., Australia.

Style Manual for Biological Journals (Second Edition), 126 pp., illus., printed, 1964, $3. American Institute of Biological Sciences, 2000 P. St. NW., Washington, D. C. 20036. This style manual is designed for research workers preparing manuscripts for publication in biological journals, and for students and other prospective authors. Style is interpreted broadly to mean forms of expression in scholarly writing, and the general technical requirements of journals, such as details for typing manuscripts, standard abbreviations, and citation of references. Included are two long chapters: one on writing which covers general principles, concise language, word usage, punctuation, and other grammatical details; another on preparation of copy--paper, typing, corrections and insertions, title, abstract, tables, statistics, quotations, footnotes, and other information needed by an author or editor. Also included are shorter chapters on approval of manuscripts and release of results, review of manuscripts, copy editing, proofreading, preservation of materials for the history of science, indexing, and useful references.

GERMAN FEDERAL REPUBLIC:

Archiv fur Fischereiwissenschaft (Archives for Fishery Science), vol. 15, no. 1, April 1964, 62 pp., illus., printed in German. Bundesforschungsanstalt fur Fischerei, Hamburg, Germany. (Available from Westliche Berliner Verlagsgesellschaft Heenemann KG, Berlin-Wilmersdorf, Germany.) Contains, among others, the following articles: "Zusammenhang zwischen Eisdrift, atmospharischer Zirkulation und Fischereii im Bereich der Fangplatze vor der sudostgronlandischen Kuste wahrend der ersten Jahreshalfte" (Relation between ice drift, atmospheric circulation, and the fisheries in the area of the fishing grounds off the southeast Greenland coast during the first half of the year), by A. Meyer; "Ergebnisse von im Jahre 1962 durchgefuhrten Garnelenmarkierungsexperimenten" (Results of the 1963 shrimp marking (color) and tagging experiments), by W. Kourist, E. Mauch and K. Tiews; and "Ein neues elektronisches Schnellverfahren zur Ermittlung der Frische von Seefischen" (A new electrical device which quickly tells the degree of freshness of sea fish), by Chr. Kennings.

Berichte der Deutschen Wissenschaftlichen Kommission fur Meeresforschung, new series, vol 17, no. 3, April 1964, 146 pp., illus., printed in German and English. E. Schweizerbart'sche Verlagsbuchhandlung (Nagele u. Obermiller), Stuttgart, Federal Republic of Germany. Contains these articles: "Biologisch-statistische untersuchungen uber die Deutsche hochseefischerei. Zusammenfassung der Teile I-IV" (Biological-Statistical investigations on the German high-seas fishery. General summary of parts I-IV), by Johannes Lundbeck; and "Uber die verbreitung der fischarten in der Nordsee. I--Juni-Juli 1959 und Juli 1960" (On the distribution of fish species in the North Sea. Part I--June-July 1959 and July 1960), by Dietrich Sahrhage.

GRAYLING:

Synopsis and Biological Data on European Grayling THYMALLUS THYMALLUS (Linnaeus) 1758, edited by Draga Jankovic, FAO Fisheries Synopsis No. 24, processed, 1964. Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

GREAT SLAVE LAKE:

The following reports are available from the Biological Station, Fisheries Research Board of Canada, London, Ont., Canada.

Round Weight Conversion Factors for Great Slave Lake Fish, by J. J. Keleher, 19 pp., Manuscript Report Series (Biological) No. 773, printed, 1964.

Data on Size of Fish from 1956-1962 Winter Great Slave Lake Commercial Fishery, by J. J. Keleher, Manuscript Report Series (Biological) No. 774, 84 pp., printed, 1964.

Data on Size of Fish from 1963 Winter Great Slave Lake Commercial Fishery, by J. J. Keleher, Manuscript Report Series (Biological) No. 778, 28 pp., printed, 1964.

Data on Size of Fish from 1963 Summer Great Slave Lake Commercial Fishery, by J. J. Keleher, Manuscript Report Series (Biological) No. 779, 58 pp., printed, 1964.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Data on Size of Fish from 1962 Summer Great Slave Lake Commercial Fishery, by J. J. Keleher, Manuscript Report Series (Biological) No. 780, 51 pp., processed, 1964.

GREENLAND:

"Rapport om tokt med F/F Johan Hjort til Vest Grønland i april/mai 1964" (Report of a trip by R/V Johan Hjort to West Greenland in April-May 1964), by Erling Bratberg and Odd Nakken, article, Fiskets Gang, vol. 50, no. 32, August 6, 1964, pp. 486-487, illus., printed in Norwegian. Fiskets Gang, Fiskeridirektoratet, Radstuplass 10, Bergen, Norway.

GROUNDFISH:

Water Economy and Osmoregulation of Plaice and Flounder, by J. Henschel, Translation No. 38, 32 pp., processed, 1964. (Translated from the German, Wiss. Meeresunters. Kiel, vol. 22, 1936, pp. 91-121.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

GULF OF MEXICO:

The Fertile Fisheries Crescent, by Gordon Gunter, 5 pp., processed. (Reprinted from Journal of the Mississippi Academy of Sciences, vol. 9, 1963, pp. 286-290.) Gulf Coast Research Laboratory, Ocean Springs, Miss. Discusses the strip of coastline lying between Pascagoula, Miss., and Port Arthur, Tex., which produced over 20 percent of the total United States fishery landings in 1961 and 1962. The volume of the Gulf fisheries has been maintained by the menhaden, and during both 1961 and 1962 production was over one billion pounds. Also thriving are the shrimp, rough fish, and oyster fisheries.

The Gulf Coast Research Laboratory (Ocean Springs, Miss.), by Gordon Gunter, 3 pp., illus., printed. (Reprinted from American Zoologist, vol. 3, no. 3, August 1963.) American Society of Zoologists, 104 Liberty St., Utica, N. Y.

HADDOCK:

The Distribution of the Haddock, 1953-1955, by R. Ya. Tseeb, Translation No. 21, 6 pp., processed, 1963. (Translated from the Russian, Akademiia Nauk SSSR, 1958, pp. 228-233.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

HERRING:

"Empleo de equipo electronico en las pesquerias de arenque de Noruega" (Use of electronic equipment in the Norwegian herring fisheries), by Torwald S. Gedharsen, article, Industrias Pesqueras, vol. 38, no. 891, June 1, 1964, pp. 269-270, printed in Spanish, single copy 50 ptas. (about 85 U. S. cents). Industrias Pesqueras, Policarpo Sanz, 21-2°, Vigo, Spain.

Herring Industry Board. Twenty-Ninth Annual Report, for the Year Ended 31st December, 1963, 43 pp., printed, 1964. Her Majesty's Stationery Office, Edinburgh, Scotland.

Herring - North Sea, 1962, Stock Record, edited by Arni Fridriksson, Statistical News Letter No. 18, 58 pp., printed, 1963. Conseil Permanent International pour l'Exploration de la Mer, Charlottenlund Slot, Charlottenlund, Denmark.

"O labil'nosti zhira Atlantichesko-Skandinavskikh sel'dei" (On the lability of fat in Atlantic-Scandinavian herring), by D. A. Shubnikov, article, Voprosy Ikhtiologii, vol. 3, no. 2, 1963, pp. 416-417, printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U. S. S. R.

Plankton and the Feeding of Baltic Herring (Salaka) Larvae in the Gulf of Riga, by L. N. Lisivnenko, Translation No. 33, 44 pp., processed, 1964. (Translated from the Russian, Trudy Nauchno-Issledovatel'skogo Instituta Rybnogo Khozyaistva, Latvia SSSR, vol. 3, 1961, pp. 105-138.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

The following reports are available from the Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

The 1961 Herring Spawn Deposition in British Columbia Coastal Waters, by D. N. Outram, Circular No. 71, 11 pp., printed, 1963.

The Extent of Herring Spawning in British Columbia in 1962, by D. N. Outram, Circular 69, 21 pp., printed, 1963.

The Extent of Herring Spawning in British Columbia in 1963, by D. N. Outram, Circular No. 70, 11 pp., printed, 1963.

HONG KONG:

Foreign Trade Regulations of Hong Kong, by Dawn A. Wachtel, OBR 64-77, 12 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Discusses Hong Kong's trade policy, import tariff, special customs provisions, shipping documents, labeling and marking requirements, nontariff import controls, export controls, United States' foreign trade controls, and diplomatic representation between the United States and that country. Includes tables showing the scale of charges levied on dutiable commodities; and commodities requiring import licenses.

ICHTHYOLOGY:

Age and Growth Studies in Fish--A Systematic Guide for Ichthyologists, by N. I. Chugunova, OTS 61-31036, 132 pp., illus., processed, 1963. (Translated from the Russian, Academy of Sciences of the U. S. S. R., Dept. of Biological Sciences, Board of Ichthyology, Institute of Animal Morphology.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

INDIA:

Administration Report for the Year 1961-62, 176 pp., printed, 1964. Madras Department of Fisheries, Madras City, India.

Report on Fisheries Survey of the River Gandak (North Bihar), by A. David, 10 pp., illus., printed, January 1963. Central Inland Fisheries Research Institute, Barrackpore, India.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

INDONESIA:

Investment Factors in Indonesia, by M. Virginia Webbert, OBR 64-79, 12 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Although direct investment is not permitted at present, a production-sharing arrangement is encouraged by the Indonesian Government. The report discusses Government controls over industry, business organization, taxation regulations, and capital availability and credit. It also covers labor conditions, basic economic facilities, investment services, and Indonesian corporation and personal income tax schedules.

INLAND FISHERIES:

A List of Inland Fishery Workers in Europe, FAO Fisheries Technical Paper No. 15, rev. 1, 80 pp., printed, 1964. European Inland Fisheries Advisory Commission, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

INTERNATIONAL COMMISSIONS:

Annual Report for the Year 1963, 89 pp., printed, 1964. Inter-American Tropical Tuna Commission, La Jolla, Calif.

Comparison and Abstracts of Selected Conventions Establishing Fisheries Commissions, 79 pp., printed, 1962. Legislation Research Branch, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

(International North Pacific Fisheries Commission) Annual Report, 1962, 130 pp., illus., printed, 1964. International North Pacific Fisheries Commission, 6640 NW. Marine Dr., Vancouver 8, B. C., Canada. This is the ninth consecutive annual report of the International North Pacific Fisheries Commission, established by a Convention between Canada, Japan, and the United States on June 12, 1953, for the purpose of promoting and coordinating the necessary scientific studies and to recommend the required conservation measures in order to secure the maximum sustained productivity of fisheries of joint interest. The report contains summary accounts of the annual meeting of the Commission held in Seattle, November 12-17, 1962, and of an interim meeting held in Honolulu, August 13-17, 1962; and a brief resume of administrative activities during the year. It also presents summaries prepared by the national research agencies of investigations which they carry out under the planning and coordination of the Commission. Of principal concern are the salmon, halibut, herring, and king crab fisheries.

Perechen Dokumentov Vosmoi Sessii Sovetsko-Iaponskoi Komissii po Rybolovstvu Sovetskie materiali Komissi, Tom II (List of Documents of the Eighth Session of the Soviet-Japanese Fisheries Commission. Materials Collected by the Soviet Union. Vol. II), 240 pp., processed in Russian, March 2, 1964. Sovetsko-Iaponskaia Komissiia po Rybologstvu v Sever-Zapadnoi Chasti Tikhogo Okeana, Vos'maia Sessiia, Moscow, U. S. S. R. Contains statistical information on 1963 coastal salmon fisheries in the Far East, by areas of fishing.

IRAN:

Selling in Iran, OBR 64-86, 8 pp., printed, July 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Extensive development programs currently are being undertaken throughout the country. A substantial market exists and will continue to exist in the foreseeable future for products and services associated with economic and social development. The report contains information on import channels and requirements; distribution practices; transportation, port, and storage facilities; and wholesale and retail channels. Also discusses commercial practices, trade customs, marketing aids, Government procurement, selling under United States programs, and information for business travelers.

IRELAND:

Report of the Minister for Lands on the Sea and Inland Fisheries for the Year 1962, 85 pp., illus., printed, September 1963, 5s. (about 70 U. S. cents). Government Publications Sales Office, G. P. O. Arcade, Dublin, Ireland. This report covers the activities of the Fisheries Division of the Department of Lands, and includes information and statistics on the quantity and value of Ireland's sea and inland fish and shellfish for 1962, and related data. Also includes sections on the herring fisheries, mackerel investigations, smolt taggings, and salmon rearing experiments.

ISRAEL:

Long-Term Projections of Supply and Demand for Agricultural Products in Israel. I--General View and Summary, by Yair Mundlak, 237 pp., illus., printed, May 1964. Blumstein's Bookstores, Tel Aviv, Israel. This volume summarizes and analyzes the results of a study of the supply and demand for agricultural products in Israel for the years 1965 and 1975. Includes several small sections concerned with fish. Per capita consumption of fish in Israel in 1960 was 10.4 kilograms; projected consumption in 1965 is 10.9 kilograms, with total consumption expected to be 27,555 tons. In view of the scarcity of water, it is unlikely that there will be a significant increase in production of pond fish. Therefore, unless sea fishing increases faster than in the past, an increase in imports of fish will be required to meet consumption at the 1960 price level. If an arbitrary projection of 20,000 tons total production in 1965 is made, the required import would be about 7,600 tons. The projected consumption of fish in 1975 is 37,900 tons. Assuming that attempts to develop sea fishing will be successful, the projected production is set at 25,000 tons. Then, imports of 12,900 tons will be required.

JAPAN:

Bulletin of the Japanese Society of Scientific Fisheries, vol. 30, no.5, May 1964, 102 pp., illus., printed in Japanese with English abstracts. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba Kaigandori 6, Minato-ku, Tokyo, Japan. Includes, among others, these articles: "On the amount of food required by the Japanese spiny lobster, *Panulirus japonicus* (V. Siebold), kept in cage in relation to size and temperature," by Masaaki Inoue; "Fundamental studies on the production of alginic acid. IV--On the pigments dissolved in the extracted

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

solution of alginic acid," by Yuzo Harada; "Studies on the effects of marine products on cholesterol metabolism in rats. II--The comparison of the effects of eicosapentaenoic and of docosahexaenoic acids," by Takashi Kaneda, Kimie Arai, and Setsuko Tokuda; "Studies on utilization of enzyme from whale pancreas. I--Proteolytic enzyme," by Yuichi Sasano and Michiko Ota; "A biological formation of formaldehyde in the muscle tissue of gadoid fish" (in English), by Keishi Amano and Kinjiro Yamada.

Bulletin of the Japanese Society of Scientific Fisheries, vol. 30, no. 6, June 1964, 81 pp., illus., printed in Japanese with English summaries. Japanese Society of Scientific Fisheries, c/o Tokyo University of Fisheries, Shiba Kaigandori 6, Minato-ku, Tokyo, Japan. Contains, among others, these articles: "On the distribution of the dolphin, Coryphaena hippurus L., in the Pacific Ocean and the Indian Ocean," by Shunpei Kojima; "On the spawning of the ayu, Piecoglossus altivelis T. & S. IV--Distribution and some geographical features of the spawning ground," by Rikizo Ishida; "Experimental use of fish pumps. IV--Stream patterns compared among various siphonage," by Shn'ichi Yajima and others; "Studies on the external mucous substance of fishes. IX--Preparation of crystalline N-acetylneuraminic acid from the external mucous substance of loach," by Noriyuki Enomoto, Hiroki Nakagawa, and Yukio Tomiyasu; "Studies on the manufacture of chondroitin sulfate from whale nasal cartilage by liquefaction method. I--Preparation of crude chondroitin sulfate by heating liquefaction," by Akimasa Nakashima, Kohei Morinaga, and Haruo Tanaka; "Studies on the antisepsis for agar during the manufacturing process in the mild winter. X--The method of detecting agar decomposing bacteria by the iodine test," by Hiroaki Fujisawa; and "Studies on the nutrition of abalone. II--Protein requirements for growth of abalone, Haliotis discus," by Chinkichi Ogino and Noriko Kato.

Trade and Industry of Japan, vol. 13, no. 2, February 1964, 70 pp., illus., printed. Japan External Trade Organization (JETRO), Publication Division, Daiichi Hotel Annex, 2-7, Uchisaiwai-cho, Chiyoda-ku, Tokyo, Japan. An issue devoted exclusively to Japanese fisheries and fish products. The lead article discusses the geography and social conditions of Japan; the economic importance of the fisheries; the history of the industry since 1930; landings in the distant-water, offshore, and inshore and coastal fisheries; improvements in efficiency and range of vessels; types of processed products manufactured; and the growth of fisheries research and resource conservation. Another covers standards and procedures for export inspection of canned, frozen, salted, and dried fishery products. Other articles describe the culture of oysters, rainbow trout, kuruma-shrimp, colored carp, and goldfish, and pearls; modern freezing and cold-storage facilities; and the production of frozen fishery products, canned fish, fish ham and sausage, dried and salted products, isinglass, fish meal, and marine animal oils.

JELLYFISH:

The Freshwater Jelly-Fish, CRASPEDACUSTA SOWERBYI in Victoria: a New Record, by John K. Ling, General Circular No. 10, 4 pp., printed, 1962. Victoria Fisheries and Wildlife Department, Melbourne, Australia.

KILKA:

The Use of Blocks of Lights in Fishing for Kilka with a Fish Pump, by I. V. Nikonorov, Translation Series No. 4446, 5 pp., printed, 1963. (Translated from the Russian, Rybnoe Khoziaistvo, 1959.) Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

KOREA:

Annual Report for Fishery Products Inspection, 1963, 212 pp., printed, 1964. Central Fisheries Inspection Station, Ministry of Agriculture and Forestry, 103 Wonnam-Dong, Chong-Ro, Seoul, Korea.

LAW OF THE SEA:

Law of the Sea--Convention on the Continental Shelf. Agreement with other Governments--Done at Geneva April 29, 1958. Entered into Force June 10, 1964, TIAS 5578, 56 pp., printed, 1964, 20 cents. Department of State, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

LIBERIA:

Foreign Trade Regulations of Liberia, by Nancy V. Rawls, OBR 64-90, 8 pp., printed, August 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) The Government of Liberia pursues a free trade policy which is designed to promote and encourage international business, to attract private foreign investment by permitting the unhampered movement of currency and goods, and to preserve the principle of most-favored-nation treatment which it accords to all its trading partners. Discusses Liberia's import tariff system, special customs provisions, internal taxes, shipping documents required, and labeling and marking requirements. Also covers import licensing, Liberia's export controls, United States foreign trade controls, and Government representation between the two countries.

LOBSTER:

The Facts about Massachusetts Lobster Statistics, by Thomas Morrissey, Special Scientific Report No. 1, 12 pp., printed, 1964. Massachusetts Division of Marine Fisheries, Boston, Mass.

"Frozen whole lobster now possible for distribution to restaurants," article, Quick Frozen Foods, vol. 27, no. 2, September 1964, p. 87, illus., printed. E. W. Williams Publications, Inc., 1776 Broadway, New York, N. Y. 10019. The successful development of a fresh frozen whole lobster which will make possible efforts of restaurant operators to keep lobster as a permanent menu item was completed recently by a New York State frozen seafood processor. In the present product, shrinkage is minimized and the meat cleaves from the shell in large sections. The taste and texture of a fresh live lobster is retained without artificial additives.

"Handling and processing Norway lobsters. Part III--Cooking experiments; Part IV--Storage experiments with Norway lobsters," by P. Hovart and W. Vyncke, article, Fishing News International, vol. 3, no. 3, July-September 1964, pp. 221-222, 224-225, 227-228, illus., printed, single copy 6s. 6d. (about 95 U. S.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England. Discusses cooking of Norway lobsters by different methods and with variations in salt content of the cooking brine. Experiments were conducted to determine whether cooked or uncooked Norway lobsters had better keeping qualities. It was found that exposure to high temperatures as it occurs frequently in practice has a very unfavorable influence on the quality of these crustaceans. These experiments also indicate that cooking on the fishing vessels could improve quality. It was observed that for storage up to 5 days, polyethylene bags are superior to paper containers in preventing loss in quality and weight.

A Report to the Fishing Industry Regarding the Tolerance of Lobsters for Fluoridated Water and for Various Woods, by James E. Stewart, Circular (New Series) No. 17, 2 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada.

MALAYSIA:

Establishing a Business in Malaysia, by Louise H. Hillson, OBR 64-78, 20 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Encouragingly, all Malaysian areas welcome the fullest participation by private capital in their economic development and make no distinction between investments from local and foreign sources. The report discusses other aspects of the investment climate, legislation governing investment, business organization, and industrial property protection. Also covers employment conditions, taxation regulations, availability of capital, basic economic facilities, and investment information services.

MARINE AIDS:

Light List, Volume II, Atlantic and Gulf Coast--Little River, South Carolina, to Rio Grande, Texas, and the Antilles, 386 pp., illus., printed, 1964, $3. U. S. Coast Guard, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Contains locations of lights, fog signals, buoys, daybeacons, lightships, radiobeacons, and loran stations from Little River, South Carolina, to Rio Grande, Texas, and for the Antilles. Intended to furnish more complete information concerning aids to navigation than can be conveniently shown on charts. Not intended to be used in navigation in place of charts and coast pilots.

Light List, vol. 4--Great Lakes. United States and Canada, 250 pp., printed, 1964. U. S. Coast Guard, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

MARINE FOULING ORGANISMS:

Catalogue of Main Marine Fouling Organisms (vol. I--Barnacles), illus., printed. Organisation for Economic Co-Operation and Development, 2 Rue Andre Pascal, Paris, France.

MARINE RESOURCES:

Report of the First Session of the Advisory Committee on Marine Resources Research, Rome, 28 January-2 February, 1963, Fisheries Report No. 14, 53 pp., processed, 1963. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

MARYLAND:

Nineteenth Annual Report, 1962, 142 pp., printed. Maryland Board of Natural Resources, Annapolis, Md.

MASSACHUSETTS:

A Technical Study of the Scallop & Flounder Industry of New Bedford, Massachusetts, 207 pp., illus., processed, $1. Area Redevelopment Administration, U. S. Department of Commerce, Washington, D. C., 1964. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Deals with the operational problems facing the fishing industry in New Bedford. Special attention was given to the personnel engaged in the industry, both those who work aboard the vessels and those who are engaged in shore facilities. Discussed in detail are the vessels, equipment, sanitation, insurance, and conservation of product. Vessel construction and sources of supply are also an integral part of the report. The problems affecting the product, in regards to geographical location, and the processing of the product, are dealt with in detail. Recommendations regarding all of the above elements have been incorporated into this report for further action for the benefit of the fishing industry in general.

MEDITERRANEAN SEA:

"Bedarf die marine fauna der mediterranen Kustenzone eines schutzes?" (Does the marine fauna of the Mediterranean coasts need protection), by H. R. Haefelfinger, article, Revue Suisse de Zoologie, vol. 70, no. 2, 1963, pp. 252-258, printed in German. Societe Suisse de Zoologie et du Muşeum d'Histoire Naturelle de Geneve, Geneva, Switzerland.

MEXICO:

Establishing a Business in Mexico, by Katherine E. Rice, OBR 64-82, 28 pp., printed, July 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) A generally accepted principle is that foreigners have the right to invest in Mexico and to withdraw the profits and proceeds provided they do so in accordance with Mexican laws. In addition to investment policy, the report discusses entrance and rights of aliens, business organization law, and taxation regulations. It also covers licensing agreements; patents, trademarks, and copyrights; labor legislation; and United States taxation of income earned in Mexico.

Estadisticas Pesqueras Concentradas, 1956-1961 (Fishery Statistics Compilations, 1956-1961), 170 pp., printed in Spanish, 1964. Direccion General de Pesca e Industrias Conexas, Secretaria de Industrias y Comercio, Mexico, D. F.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

MOLLUSCS:

Physiology of Mollusca, edited by Karl M. Wilbur and C. M. Yonge, 1 vol., illus., printed, 1964. Academic Press, Inc., 125 E. 23rd St., New York, N. Y. 10010.

MUSSELS:

Contribucion al Estudio Biologico del MYTILUS PLATENSIS (Contribution to the Biological Study of Mytilus platensis), by Zulma J. Ageitos de Castellanos, 29 pp., illus., printed in Spanish, 1962. Secretaria de Agricultura y Ganaderia de la Nacion Buenos Aires, Argentina.

The Distribution, Ecology, and Life History of the Mussel, ACTINONAIAS ELLIPSIFORMIS (Conrad), in Michigan, by Henry Van der Schalie, Occasional Papers No. 633, 17 pp., illus., printed, 1963. Museum of Zoology, University of Michigan, Ann Arbor, Mich.

"Mussel culture," by B. H. Havinga, article, Sea Frontiers, vol. 10, no. 3, July 1964, pp. 155-161, illus., printed. Institute of Marine Science, University of Miami, 1 Rickenbacker Causeway, Miami, Fla. 33149. Discusses the marine food chain and the part played by the mussel in that chain; the culture of mussels in the Netherlands, France, and Spain--collection and sowing of seeds, care and feeding of the young, and harvesting of mature mussels and preparation for market; and possibilities of expanding the industry.

NATURAL RESOURCES:

The following United States papers prepared for the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas, held at Geneva, February 1963, by the Science Conference Staff, Agency for International Development, U. S. Department of State, Washington, D. C., are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Natural Resources--Energy, Water, and River Basin Development, vol. I, 386 pp., illus., printed, $1.25.

Natural Resources--Minerals and Mining, Mapping and Geodetic Control, vol. II, 362 pp., illus., printed, $1.

Agriculture, vol. III, 272 pp., illus., printed, 75 cents. Includes the following articles on fishery resources and production: "Development of modern fisheries: experiences in the United States," by Lionel Walford; "Improvement of production and preservation methods in an underdeveloped fishery through upgrading fishing vessels, gear, and sanitary procedures," by Charles Butler, H. B. Allen, and Lee Alverson; and "Ocean fishery products and their inland transport in less developed areas," by Wilbert M. Chapman and others.

Industrial Development, vol. IV, 198 pp., printed, 55 cents.

Transportation, vol. V, 164 pp., illus., printed, 50 cents.

Health and Nutrition, vol. VI, 202 pp., illus., printed, 60 cents.

Social Problems of Development and Urbanization, vol. VII, 98 pp., printed, 35 cents.

Organization, Planning and Programming for Economic Development, vol. VIII, 150 pp., illus., printed, 45 cents.

Scientific and Technological Policy, Planning, and Organization, vol. IX, 71 pp., printed, 30 cents.

International Cooperation and Problems of Transfer and Adaptation, vol. X, 71 pp., illus., printed, 30 cents.

Human Resources--Training of Scientific and Technical Personnel, vol. XI, 216 pp., illus., printed, 60 cents.

Communications, vol. XII, 170 pp., illus., printed, 50 cents.

NEW HAMPSHIRE:

Fisheries Division, Annual Report of Operations, 1963, 29 pp., printed, 1963. Fisheries Division, New Hampshire Fish and Game Department, Concord, N. H.

NEW MEXICO:

Natural Resources of New Mexico, 71 pp., illus., printed, 1964. U. S. Department of the Interior, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

NORTHEAST ATLANTIC OCEAN:

"Compte rendu preliminaire de la campagne de la Thalassa en Islande, aux Feroe et a Rockall (Mai-Juin 1963)" (Preliminary report on the cruise of the Thalassa to Iceland, the Faroes, and Rockall Bank--May-June 1963), by Louis Faure, article, France Peche, no. 86, July-August 1964, pp. 39-43, illus., printed in French. France Peche, Boite Postale 179, Lorient, France.

NORTHEASTERN PACIFIC OCEAN:

Soviet Fisheries Investigations in the North-Eastern Part of the Pacific Ocean, edited by P. A. Moiseev, Trudy, vols. 48 and 49, printed in Russian with English summary and table of contents, 1963-1964. Vsesoiuznyi Nauchno-Issledovatel'skii Institut Morskogo Rybnogo Khoziaistva i Okeanografii, Verkhn. Krasnosel'skaia Ul. No. 17, Moscow, U. S. S. R.

NORTHERN RHODESIA:

(Joint Fisheries Research Organization) Annual Report, No. 11, 1961, 118 pp., printed, 1964. Joint Fisheries Research Organization, Lusaka, Northern Rhodesia.

NORWAY:

Fiskeristatistikk 1962 (Fishery Statistics 1962), Norges Offisielle Statistikk XII 144, 84 pp., illus., printed in Norwegian with English table of contents. Fiskeridirektøren, Bergen, Norway. Contains statistical tables on number of fishermen by sole, main, and subsidiary occupation; open and decked-powered fishing vessels by length; quantity and value of all Norwegian sea fisheries, annual average; quantity and value of each species; quantity and value of processed fish products landed; disposition of landings; exports and imports of fish and fishery products; winter herring by disposition; and other related data.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

OCEANOGRAPHY:

Achievements in Oceanography. No. 1--Progress in the Study of the Depths of the Oceans, edited by Lev Aleksandrovich Zenkevich, OTS 60-41204, 253 pp., illus., printed, 1960. (Translated from the Russian, Itogi Nauki, 1959, pp. 5-147.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Boletin del Instituto Oceanografico, vol 1, no. 1, July 1961, 286 pp., illus., printed in Spanish and English, single copy Bs. 6 (about US$1.80). Instituto Oceanografico, Universidad de Oriente, Apartado de Correos 94, Cumana, Venezuela. Includes, among others, an article on: "A racial investigation of the bluefish, Pomatomus saltatrix (Linneaus) of the Atlantic Coast of North America," by William Albert Lund, Jr.

Boletin del Instituto Oceanografico, vol. 1, no. 2, December 1961, 200 pp., illus., printed in Spanish and English, single copy Bs. 6 (about US$1.80). Instituto Oceanografico, Universidad de Oriente, Apartado de Correos 94, Cumana, Venezuela. Includes, among others, these articles: "On some oceanographic observations in the southeastern Caribbean Sea and the adjacent Atlantic Ocean with special reference to the influence of the Orinoco River," by Herman G. Gade; and "Osteologia comparada en ocho especies de Pomadasyidae (Pisces-Perciformes) del Golfo de Cariaco, Venezuela, y áreas adyacentes" (Comparative osteology of 8 species of Pomadasyidae--Pisces--Perciformes--of the Gulf of Cariaco, Venezuela, and adjacent areas), by Francisco Mago Leccia.

Current Bibliography for Aquatic Sciences and Fisheries (Vol. 5, Subject Index--Physical Oceanography), FIb/35, processed, November 1963. Biology Branch, Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Current Bibliography for Aquatic Sciences and Fisheries (Vol. 6, Subject Index--Physical Oceanography), FIb/39, processed, March 1964. Biology Branch, Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Car acalla, Rome, Italy.

The Design of a Deep Moored Oceanographic Station, by George R. Schick, 14 pp., printed, 1963. Scripps Institution of Oceanography, University of California, La Jolla, Calif. The overall design techniques for a taut nylon mooring are covered. Factors that influence the selection of a surface float configuration are discussed. Deals with some problems of instrument line design and manufacture. A summary of recent experience with this type of mooring is presented.

Developments in Soviet Oceanography, JPRS 21,278, 20 pp., illus., printed, 1963. (Translated from the Russian, Priroda, no. 6, June 1963.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20230.

International Marine Science, vol. II, no. 1, January 1964, 42 pp., processed, Fisheries Biology Branch, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. Includes an excerpt from an address by the late President John F. Kennedy concerning oceanographic research; reports of national committees of Poland and Republic of South Africa; data on the national oceanographic programs of Argentina, Federal Republic of Germany, Chile, Korea, Portugal, United Kingdom, and U. S. S. R.; and information on the Guinean Trawling Survey, and ICNAF Environmental Study. Also outlines forthcoming meetings on marine sciences; meetings of the IOC Working Group on Communications, World Food Congress, International Association of Physical Oceanography, and FAO Working Party for the Rational Utilization of Tuna Resources of the Atlantic Ocean; training courses and seminars, and fellowships; new oceanographic equipment and research craft; and activities of the Intergovernmental Oceanographic Commission, Scientific Committee on Oceanic Research, and the World Meteorological Organization.

International Marine Science, vol. II, no. 2, April 1964, 40 pp., processed. Fisheries Biology Branch, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy Contains information on national committees for oceanographic research in Malaysia, the United States, and Italy; and these international organizations--South West Atlantic Fisheries Advisory Commission, East African Marine Fisheries Research Organization, Inter-Governmental Maritime Consultative Organization, International Association of Physical Oceanography, Pacific Science Association, and Permanent International Association of Navigation Congresses. Outlines the national oceanographic programs of Argentina, Denmark, Federal Republic of Germany, Spain, Sweden, United Kingdom, the United States, and Portugal; projects of the International Biological Programme, International Indian Ocean Expedition, and ICNAF Environmental Study; forthcoming meetings on marine sciences; training courses and seminars, and fellowships; new oceanographic equipment; and activities of the Intergovernmental Oceanographic Commission, and the FAO Advisory Committee on Marine Resources Research.

Lines of Research on Seawater Fertility, by Luigo Provasoli, 32 pp., illus., printed in Japanese with English bibliography, March 28, 1964. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

Oceanographic Bibliography, 1960-1963, compiled by H. B. Hachey, 16 pp., printed, 1963. Canadian Committee on Oceanography, St. Andrews, N. B. Canada.

An Oceanographic Investigation of Causes, Mechanisms, and Predictability of Changes in Availability of Tuna in the Eastern Tropical Pacific, Quarterly Report No. 11, 1960; Half-Yearly Report, July-December, 1962, STOR Program Progress Reports, printed. Scripps Institute of Oceanography, La Jolla Calif.

"Okeanograficheskie organizatsii Kanady i osnovnaya tematika ikh rabot" (Oceanographic organizations of Canada and the principal subject of their studies), by A. Ya. Minevich, article, Okeanologiya, vol. 2, no. 5, 1962, pp. 947-948, printed in Russian. Okeanologiya, Akademiia Nauk SSSR, Moscow, U. S. S. R.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Preliminary Report on Marine Biological Anomalies on the Pacific Coast of Japan in Early Months of 1963, with Reference to Oceanographic Conditions, by Zinziro Nakai, and others, Contribution A-199, 19 pp., illus., printed. (Reprinted from Bulletin of Tokai Regional Fisheries Research Laboratory, no. 38, February 1964, pp. 57-75.) Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

"Sources of limnological and oceanographic apparatus and supplies," by J. F. T. Saur and others, article, Limnology and Oceanography, suppl. to vol. 9 (Special Publication No. 1, Third Revision), pp. 1-32, printed. Woods Hole Oceanographic Institution, Woods Hole, Mass.

Soviet Oceanography, issue no. 3, 1962 series, 51 pp., illus., processed, single copy $8.50. American Geophysical Union, Suite 506, 1145 19th St. NW., Washington, D. C. 20036. Contains articles translated from the oceanology sections of Doklady of the Academy of Sciences of the U. S. S. R., vols. 142-147, 1962, and 148-153, 1963. Includes, among others articles on: "The tropical phytoplankton of the Indian Ocean," by I. N. Sukhanova; "Distribution of mass species of the Genus Calanus in the Southern Hemisphere," by K. A. Brodskiy; and "Quantitative distribution of bottom fauna in the northern part of the Arabian Sea and in the Bay of Bengal," by M. N. Sokolova and F. A. Pasternak.

Undersea Technology, vol. 5, no. 5, May 1964, 51 pp., illus., printed, single copy $1. Compass Publications, Inc., 1111 N. 19th St., Arlington, Va. 22209. Contains among others, articles on: "Congress looks to the sea;" "Oceanography pot boils," by Richard E. Munske; and "Engineering the oceans," by Athelstan Spilhaus.

OCEAN PERCH:

Biology of Reproduction of the Redfishes SEBASTES MARINUS L. and SEBASTES MENTELLA Travin in the Barents and Norwegian Seas, by V. P. Sorokin, Translation Series No. 308, 10 pp., processed, 1960. (Translated from the Russian, Ikhtiologicheskaia Komissiia Akademii Nauk SSSR, Trudy Soveshchanii, no. 8, 1959, pp. 158-170.) Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada.

Report on the North Atlantic Redfish Fisheries, 9 pp., printed, 1964. White Fish Authority, Lincoln's Inn Chambers, 2/3 Cursitor St., London EC4, England.

"Scottish redfish larval investigations in 1962 with some observations on mid-oceanic echo-traces," by D. F. S. Raitt, article, Journal Du Conseil, vol. 29, no. 1, June 1964, pp. 65-72, illus., printed, single copy 16 kr. (about US$2.30). Andr. Fred. Host & Son, Bredgade, Copenhagen, Denmark.

OCTOPUS AND SQUID:

"Blekkspruten, den betydning i verdenshusholdningen--Litt norsk import av hermetisk vare fra Japan og Portugal" (Octopus and Squid, their importance in the world economy--small Norwegian import of canned goods from Japan and Portugal), by B. Løvas-Svendsen, article, Tidsskrift for Hermetikindustri, vol. 50, no. 8, August 1964, pp. 269-273, illus., printed in Norwegian. Norske Hermetikfabrikers Landsforening, Stavanger, Norway.

ODOR ABATEMENT:

Odour Abatement Tests at a Fishmeal Plant, by S. W. F. Hanson, Torry Memoir No. 164, 4 pp., illus., printed. (Reprinted from Fishing News International, April-June 1964.) Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

OKLAHOMA:

Standing Crop of Fish in Oklahoma Ponds, by Robert M. Jenkins, Report No. 65, 15 pp., illus., printed, 1958. Department of Wildlife Conservation. Fisheries Division, Oklahoma City, Okla.

OREGON:

Annual Report, 1962, 409 pp., printed, 1963. Fishery Division, Oregon Game Commission, Portland, Oreg.

OTOLITHS:

"Burning of otoliths, a technique for age determination of soles and other fish," by Jorgen Møller Christensen, article, Journal Du Conseil, vol. 29, no. 1, June 1964, pp. 73-81, illus., printed, single copy 16 kr. (about US$2.30). Andr. Fred. Host & Son, Bredgade, Copenhagen, Denmark.

OYSTERS:

"Building an oyster cleansing plant," article, Fisheries Newsletter, vol. 23, no. 7, July 1964, pp. 23-26, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, Australia. Discusses the construction and operation of an inexpensive plant for purifying oysters from sewage pollution. Water is pumped into tanks from the sea and used for 7-14 days. During this period several batches of oysters may be purified in the same water, each batch being held for two nights (36 hours minimum). In managing the unit, consisting of a large subdivided concrete tank, each half of the plant may be filled with oysters on alternate days so that cleansed oysters are available daily. Water is sterilized by exposure to ultra-violet lamps for 24 hours, immediately after being pumped from the sea.

The Effect of Kraft Mill Effluent on the Pacific Oyster (CRASSOSTREA GIGAS) with Particular Reference to Crofton, B. C.," by D. B. Quayle, Manuscript Report Series (Biological) No. 765, 20 pp., illus., printed, 1964. Biological Station, Fisheries Board of Canada, Nanaimo, B. C., Canada.

Recherches sur l'Ostreiculture dans le Bassin de Chasse d'Ostende en 1960 (Research on Oyster Culture in the Tidal Basin at Ostende in 1960), by E. LeLoup and others, 89 pp., illus., printed in French. Ministere de l'Agriculture, Commission T. W. O. Z., Group de Travail Ostreiculture, Ostende, Belgium.

PACIFIC OCEAN:

A Study of Demersal Fishes and Fisheries of the Northeastern Pacific Ocean, by D. L. Alverson, A. T. Pruter, and L. L. Ronholt, H. R. MacMillan Lectures in Fisheries, 194 pp., illus., printed, 1964. Institute of Fisheries, The University of British Columbia, Vancouver, B. C., Canada. Each year, under a fund established by Dr. H. R. MacMillan, a series of

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

lectures or a symposium is presented at the Institute of Fisheries, The University of British Columbia, on problems of current interest. When appropriate, the material presented at those sessions has been assembled for publication. This is the fourth such report to be issued. Its purposes are to (1) review the development and magnitude of demersal fisheries in the northeastern Pacific Ocean; (2) describe the gear and fishing techniques used to harvest the resources; (3) summarize results of exploratory fishing surveys to provide information on the distribution, relative abundance, and sizes of demersal fishes inhabiting the continental shelf and continental slope off North America from Oregon to the Bering Sea; and (4) consider the magnitude and current use of demersal fish stocks. Included are chapters on Pacific Coast groundfish fisheries; fishing by Asian nations in the eastern North Pacific; history of United States groundfish explorations--regions surveyed and methods of analysis; flounders; and rockfish. Also discussed in detail are roundfish--cod, hake, sablefish, greenlings, rattails, and sculpins; sharks, skates, and ratfishes; the demersal fish community; distribution and relative abundance as related to environmental factors; and the resource and its use.

PARASITES:

Estimation of Incidence of Larval Nematodes in Cod Fillets from the Southern Canadian Mainland to 1963, by F. D. McCracken and D. N. Fitzgerald, Manuscript Report Series (Biological) No. 781, 10 pp., printed, 1964. Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada.

PERU:

Market Factors in Peru, by Richard H. Mullins, OBR 64-76, 12 pp., printed, June 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Peru's economy continued its favorable growth in 1963, with real gross national product increasing by 5-1/2 percent. The outlook for 1964 was for somewhat faster growth than in 1963. It is expected that Peru will demand more and more capital goods as opposed to consumer goods in coming years. In addition to future outlook, the report discusses the scope and nature of the Peruvian market; competition and the United States share of the over-all market; and a market analysis for selected commodities and services.

PESTICIDES:

"Alteration in nerve cells in fish and crustaceans caused by insecticides," by H. Kayser, D. Ludemann, and H. Neumann, article, Water Pollution Abstracts, vol. 37, no. 1, 1964, 173, printed. Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London EC4, England.

"Investigations into the toxicity of some herbicides for fish. 10--On the toxicity of modern pest-destroying agents for fish," by G. Bodenstein and G. M. Bastgen, article, Water Pollution Abstracts, vol. 36, no. 3, 1963, 518, printed. Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London EC4, England.

PIKE-PERCH:

Synopsis of Biological Data on Pike-Perch, LUCIOPERCA LUCIOPERCA (Linnaeus) 1758, FB/S28, processed, March 1964, Biology Branch, Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

PLAICE:

Plaice Investigations in Scottish Waters. 1--Size-Composition of the Stocks, 1910-1952, Marine Research 1964 No. 1, 29 pp., printed, 1964. Department of Agriculture and Fisheries for Scotland, Edinburgh, Scotland. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.)

On the Relation between Stock Density and Growth in the Plaice Population of the German Bight, by Gotthilf Hempel, Translation 23, 8 pp., printed, 1964. (Translated from the German, Berichte der Deutschen Wissenschaftlichen Kommission für Meeresforschung, vol. 14, no. 2, 1958.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

PLANKTON:

The Pilchard of South West Africa (SARDINOPS OCELLATA)--Zooplankton Studies in the Waters off Walvis Bay with Special Reference to the Copepoda, by H. K. Unteruberbacher, Investigational Report No. 11, 78 pp., illus., printed, 1964. Marine Research Laboratory, Administration of South West Africa, Windhoek, South West Africa.

"Tiny drifters of the sea," by John J. Lee and Hugo Freudenthal, article, Natural History, vol. 73, no. 8, October 1964, pp. 44-45, illus., printed, single copy 50 cents. The American Museum of Natural History, Central Park W. at 79th St., New York, N. Y. 10024.

POLLUTION:

Toxicity of Pollution to Aquatic Life - a Summary of Research in Canada, by J. B. Sprague, Manuscript Report Series (Biological) No. 771, 18 pp., printed, 1964. Biological Station, Fisheries Research Board of Canada, St. Andrews, N. B., Canada.

PORTUGAL:

Boletim da Pesca, vol. 16, no. 83, June 1964, 83 pp., illus., printed in Portuguese. Gabinete de Estudos das Pescas, R. S. Bento, 644, 4º Esq., Lisbon, Portugal. Includes articles on: "Algumas consideracoes sobre os indices de abundancia da Pescado (Merluccius merluccius L.) na costa of Portugal" (Some considerations on the indexes of abundance of fish--Merluccius merluccius L.--along the coast of Portugal), by Rui Monteiro; "Alguns aspectos da conservacao do peixe pelo sal e sua bacteriologia" (Some aspects of preservation of fish by salt and its bacteriology), by A. T. Botelho; "Selectividade de redes de arrastar" (Selectivity of trawl nets), by Rui Monteiro; and "Portugal e as suas relacoes piscatorias com a Terra Nova e o Canada" (Portugal and its fishery relations with Newfoundland and Canada), by Eurico A. Valadao do Vale.

PREDATORS:

On the Characteristics of the Effects of Predatory Fishes on the Structure of Commercial Fish Populations, by K. R. Fortunatova, Translation 29, 4 pp., printed, 1964. (Translated from the Russian, Trudy Sovesh-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

chanii, no. 133, 1961.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

PRESERVATION:

The Work of the Torry Research Station and the Humber Laboratory for Research on the Problems of Handling and Preservation of Fish and Fishery By-Products. A Brief Description, 23 pp., illus., printed. Department of Scientific and Industrial Research, Hereford, England.

PROCESSING:

"A practical method for brining and smoking fish," by A. W. Lantz, article, Trade News, vol. 16, no. 12, June 1964, pp. 14-17, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada. Describes, with the help of drawings, the 9 steps involved in brining and smoking fresh-water fish. Included is a plan of the smokehouse, which can be constructed at home. Fish which can be smoked are goldeye, whitefish, tullibee, trout, mullet, pike, and pickerel.

Processing Mussels, Cockles and Whelks, by J. J. Waterman, Torry Advisory Note No. 13, 10 pp., illus., printed, December 1963. Torry Research Station, Aberdeen, Scotland.

A Report to the Fishing Industry on the Problem of Excess Moisture in Fish, by H. E. Power, Circular (New Series) No. 16, 3 pp., printed. Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada.

QUALITY:

Les Causes de l'Altération du Poisson et l'Influence de la Temperature (Causes of Deterioration of Fish and the Influence of Temperature), by P. Hovart, E. Van Damme, and W. Vyncke, 42 pp., illus., printed in French. (Reprinted from Revue de l'Agriculture, vol. 17, nos. 5-6, May-June 1964, pp. 647-688.) Ministere de l'Agriculture, 10 rue du Meridien, Brussels, Belgium.

"The enzymatic degradation of neurosine as an index of fish quality," by Morris H. Baslow, article, American Zoologist, vol. 3, no. 4, 1963, p. 536, printed. American Society of Zoologists, 104 Liberty St., Utica, N. Y.

RADIATION PRESERVATION:

A Report to the Fishing Industry on the Use of Radiation for the Preservation of Marine Products, by H. E. Power, Circular (New Series) No. 18, 2 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Halifax, N. S., Canada.

RADIOACTIVITY:

On the Accumulation of Fission Products by Marine Organisms. I--The Accumulation of Strontium-90, Yttrium-91 and Cerium-144 by Benthic Plants and Animals, by G. G. Polikarpov. Translation No. 30, 13 pp., processed, 1964. (Translated from the Russian, Nauchnye Doklady Vysshei Shkoly, Biologivhrdkir Nauki, no. 3, 1960.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

"The uptake of radioactivity by fish and shellfish. I--134 Caesium by whole animals," by F. Morgan, article, Journal of the Marine Biological Association of the United Kingdom, vol. 44, no. 1, 1964, pp. 259-271, printed. Cambridge University Press, 200 Euston Rd., London NW1, England.

RAYS:

Nuevas Especies de "Rayas" para la Fauna del Peru (New Species of "Rays" among the Fauna of Peru), by Norma Chirichigno F., Serie de Divulgacion Cientifica 20, 13 pp., illus., printed in Spanish, 1963. Servicio de Pesqueria, Lima, Peru.

RETAILING:

Fish Display in Retail Shops, Torry Advisory Note No. 12, 7 pp., illus., printed, 1963. Torry Research Station, Aberdeen, Scotland.

ROCKFISH:

"Sebastodes phillipsi, a new Scorpaenid fish from Californian waters," by John E. Fitch, article, Copeia, no. 3, September 10, 1964, pp. 525-529, illus., printed. American Society of Ichthyologists and Herpetologists, 18111 Nordhoff St., Northridge, Calif. Describes the discovery and identification of a new rockfish from California waters. This fish is found between Monterey Bay and Santa Catalina Island, usually in water deeper than 800 feet. Because of its habit of changing color from a whitish-pink to golden-crimson when boated, it is given the common name of "chameleon rockfish." This species proved to be identical to a fish previously described in 1957 but thought to be a hybrid.

SAFETY:

Safety Afloat, 18 pp., illus., printed. Mobil Oil Company, Marine Retail Department, 150 E. 42nd St., New York, N. Y. 10017. Contains safety rules of value to both the professional and the amateur boatman. Illustrated with colored drawings, it includes information on the pre-cruise safety checklist; buoys, waterway markers; rules of the road; Coast Guard requirements for small craft; emergency drills; safe water skiing; safe fueling procedures; artificial respiration; first aid at a glance; anchoring; coastal weather warnings; and distress signals.

SALMON:

Abundance, Distribution, and Size of Juvenile Red Salmon of the 1960 Year Class in Iliamna Lake, Alaska, by Ole A. Mathisen, Contribution No. 167, 12 pp., printed, 1964. College of Fisheries, University of Washington, Seattle, Wash.

Annual Report, 1963, 47 pp., printed, 1964. Skeena Salmon Management Committee, Biological Station, Fisheries Research Board of Canada, Nanaimo, B.C., Canada.

Artificial Propagation of Salmon in Japan, by T. Mihara, S. Sano, and H. Eguchi, 62 pp., illus., printed in Japanese. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

On the Artificial Reproduction of Salmon Stocks of the USSR, by H. Sakiura, S. Yuhashi, and Y. Koyama, Overseas Fisheries Series No. 1, 72 pp., illus., printed in Japanese, February 10, 1964. Japan Fish-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

eries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

The Chinook and Coho Salmon Fisheries of British Columbia, by D. J. Milne, Bulletin No. 142, 46 pp., printed, 1964. Fisheries Research Board of Canada, Sir Charles Tupper Bldg., Riverside Dr., Ottawa, Canada.

The Ecology of the Young Stages of the Atlantic Salmon in the River Bran, Ross-Shire, by D. H. Mills, Freshwater and Salmon Fisheries Research No. 32, 58 pp., printed, 1964. Department of Agriculture and Fisheries for Scotland, Edinburgh, Scotland. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.)

Experiments on the Effect of Captivity on Salmon Behaviour, by D. V. Ellis, Manuscript Report Series (Biological) No. 756, 30 pp., printed, 1964. Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

Factors Affecting Marine Age at Return in Sockeye Salmon, by Ted S. Y. Koo, Circular No. 208, 9 pp., printed, 1964. Fisheries Research Institute, University of Washington, Seattle, Wash.

"Indian River spawning channel," by J. J. Quigley, article, Trade News, vol. 17, no. 2, August 1964, pp. 3-4, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada.

The Migration and Exploitation of Pink Salmon Runs in and Adjacent to the Fraser River Convention Area in 1959, by E. H. Vernon, A. S. Hourston, and G. A. Holland, Bulletin XV, 302 pp., illus., printed, 1964. International Pacific Salmon Fisheries Commission, P. O. Box 1120, New Westminster, B. C., Canada.

"Mortality of pink and chum salmon eggs and larvae in southeast Alaska streams," by William John McNeil, article, Disseration Abstracts, vol. 23 (12 Pt. 1), 1963, pp. 4489-4490, printed. University Microfilms, University of Michigan, 313 N. 1st St., Ann Arbor, Mich.

"Nablyudeniya za nerestom gorbushi Oncorhynchus gorbusha (Walbaum) i letnei kety Oncorhynchus keta (Walbaum) v reke My (liman Amura)" (Observations of spawning of pink salmon Oncorhynchus gorbuscha--Walbaum--and chum salmon Oncorhynchus keta--Walbaum--in the My River--Amur Estuary), by I.I. Strekalova, article, Voprosy Ikhtiologii, vol. 3, no. 2, 1963, pp. 256-265, illus., printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U. S. S. R.

"On the problems of population dynamics relevant to immature salmon caught offshore in the North Pacific," by Takeyuki Doi, article, Bulletin of the Tokai Regional Fisheries Research Laboratory, no. 35, 1962, pp. 1-8, printed. Tokai Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Tokyo, Japan.

"Rol' vitaminov A i B_1 v vyrashchivanii molodi lososya" (The role of vitamins A and B_1 in the rearing of salmon fry), by Z. I. Chudova, article, Trudy Nauchno-Issledovatel'skii Instituta Rybnoe Khoziaistva Latviisk. SSR, vol. 3, 1961, pp. 421-429, printed in Russian. Four Continent Book Corp., 156 5th Ave., New York, N. Y. 10010.

Salmon Packing; Equipment and Operation, by S. W. Roach and F. G. Claggett, Circular No. 30, 7 pp., printed, 1964. Technological Research Laboratory, Fisheries Research Board of Canada, Vancouver, B. C., Canada.

Sizes and Ages of Chinook (ONCORHYNCHUS TSCHAWYTSCHA) and Coho (O. KISUTCH) salmon in the British Columbia Troll Fisheries (1952-1959) and the Fraser River Gill-Net Fishery (1956-1959), by D. J. Milne, Manuscript Report Series (Biological) No. 776, 36 pp., illus., printed, 1964. Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

The Stock of Baltic Salmon and the Swedish Tagging Experiments, by Borje Carlin, Circular No. 213, 27 pp., printed, 1964. (Translated from the Swedish, Laxforskninginstutet Meddelande.) Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, Wash.

The Susceptibility of Salmonid Fish to Poisons under Estuarine Conditions. 1--Zinc Sulphate, by D. W. M. Herbert, Reprint No. 441, 5 pp., printed, 1964. (Reprinted from International Journal of Air and Water Pollution, 1964.) Water Pollution Research Laboratory, Stevenage, Hertford, England.

"O vozraste i dinamike chislennosti tikhookeanskoi gorbushi Oncorhynchus gorbusha (Walb.)" (On the age and population dynamics of the Pacific pink salmon Oncorhynchus gorbuscha (Walb.), by Yu. E. Lapin, article, Voprosy Ikhtiologii, vol. 3, no. 2, 1963, pp. 243-255, illus., printed in Russian. Akademiia Nauk SSSR, Ikhtiologicheskaia Komissaia, Moscow, U.S.S.R.

The following articles were published in Oregon Fish Commission Research Briefs, vol. 9, no. 1, 1963, printed. Fish Commission of Oregon, 307 State Office Bldg., 1400 SW. 5th Ave., Portland, Oreg. 97201:

"An attempt to mark juvenile silver salmon by feeding selected metallic compounds," by Thomas B. McKee and Wallace F. Hublou, pp. 27-29, illus.

"Length-weight relationship of artificially propagated juvenile silver salmon," by David A. Leith and Ellis J. Wyatt, pp. 37-41, illus.

"An operculum marking experiment on juvenile chinook salmon," by Earl F. Pulford and Lawrence M. Woodall, pp. 30-36, illus.

SALMON AND TROUT:

Cyanide in Salmon and Brown Trout, by A. V. Holden and K. Marsden, Freshwater and Salmon Fisheries Research 33, 15 pp., illus., printed, 1964, 4s. (about 80 U. S. cents). Department of Agriculture and Fisheries for Scotland, Edinburgh, Scotland. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.)

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Investigation and management of Atlantic salmon and trout. Part 1--The research program; Part 2--The management program," article, Trade News, vol. 17, no. 1, July 1964, pp. 3-15, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada. Summarizes the 1963-64 research programs conducted by the Fisheries Research Board of Canada's Biological Stations at St. Andrews, N. B., and St. John's, Newfoundland. Investigations were made of the effect of insecticide spraying of New Brunswick forests and associated abundance of salmon; merganser (fish-eating ducks) control; Pollett River, N. B., salmon studies; return of experimentally-displaced salmon parr to their "homes;" return of tagged and marked native smolts in the northwest Miramichi River; Canadian tagged salmon recaptured near Greenland, and mine waste pollution studies. Summarizes the 1963-64 management program in the Maritimes area, Quebec, and Newfoundland. Activities included construction of fish facilities for dams, operation of fish culture stations, salmon transfers, spawning channels, and remedial work on logging dam obstruction.

The Occurrence and Pathology of Dee Disease, by Isabel W. Smith, Freshwater and Salmon Fisheries Research 34, 15 pp., illus., printed, 1964, 15s. (about US$3). Department of Agriculture and Fisheries for Scotland, Edinburgh, Scotland. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.)

SANITATION:

Food-plant Sanitation, by Milton E. Parker and John H. Litchfield, 401 pp., illus., printed, 1962. Reinhold Publishing Corporation, 430 Park Ave., New York 22, N. Y.

Shellfish Sanitation Workshop: Proceedings, November 28-30, 1961, 288 pp., printed, 1962. Public Health Service, U. S. Department of Health, Education, and Welfare, Washington, D. C. 20201.

SARDINE:

Efficiency and Rate of Yolk Utilization by Developing Embryos and Larvae of the Pacific Sardine SARDINOPS CAERULEA (Girard), by Reuben Lasker, 9 pp., illus., printed. (Reprinted from Journal of the Fisheries Research Board of Canada, vol. 19, no. 5, 1962, pp. 867-875.) Fisheries Research Board of Canada, Sir Charles Tupper Bldg., Riverside Dr., Ottawa, Canada.

"A sardinha portuguesa de que todo o mundo gosta e uma das maiores fontes de requeza nacional" (The Portuguese sardine, which is enjoyed by the whole world, is one of the major sources of national wealth), article, Jornal do Pescador, vol. 26, no. 306, July 1964, pp. 41-44, printed in Portuguese, single copy 5 escudos (about 18 U.S. cents), Junta Central das Casas dos Pescadores, Rua de S. Bento, 644-4º, Lisbon, Portugal.

World Scientific Meeting on the Biology of Sardines and Related Species, Rome, 1959--Documents to be Considered by Working Group on Sardine Measuring, 1 vol., illus., printed in French, Spanish, and English, 1959. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

SARDINE AND ANCHOVY:

Studies on the Sardine (SARDINA PILCHARDUS Walb.) and Anchovy (ENGRAULIS ENCRASICHOLUS L.) in the Gulf of Naples and Their Behaviour to Artificial Light, by Olav Dragesund, GFCM Studies and Reviews No. 23, 44 pp., illus., processed, June 1964. General Fisheries Council for the Mediterranean, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

SCALLOPS:

"Scallop market," article, Fisheries Newsletter, vol. 23, no. 8, August 1964, pp. 19, 21, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, Australia. Since Australian scallop production in 1963-64 expanded substantially with the utilization of new beds in Victoria, the need to increase exports became apparent. Australian Trade Commissioners overseas were asked to evaluate markets for scallops. This article summarizes the results of those evaluations in France, Belgium, Malaysia, the Pacific Islands, United Kingdom, Greece, Hong Kong, Kenya, Bahrein and Kuwait, the United States, Lebanon, and Venezuela. Included is a table showing estimated Australian scallop exports, 1960/61-1963/64.

SCHOOL-LUNCH PROGRAM:

Food Buying Guide for Type A School Lunches, PA-270 (Revised), 75 pp., illus., printed, $1.25, January 1964. U. S. Department of Agriculture, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 20402.) Provides information for planning and calculating the quantities of food, including fish and shellfish, to be purchased and used by schools serving Type A lunches in the National School Lunch Program. The Type A lunch pattern is a guide to well-balanced lunches. It is designed to help in planning lunches that supply the kind and amount of foods children need.

SEALS:

"About seals," by Bennet B. Rae, article, Scottish Fisheries Bulletin, no. 21, June 1964, pp. 21-24, printed. Scottish Fisheries Bulletin, Department of Agriculture and Fisheries for Scotland. Edinburgh, Scotland.

"Grey seals and fisheries," by E. B. Worthington, article, Nature, vol. 203, no. 4941, July 11, 1964, pp. 116-118, printed, single copy 4s. (about 55 U.S. cents). St. Martin's Press, Inc., 175 Fifth Ave., New York 10, N. Y.

SEAWEEDS:

Annual Report for 1963, 20 pp., printed. Institute of Seaweed Research, Inveresk, Midlothian, Scotland. Discusses developments in the Scottish and foreign seaweed byproducts industry during 1963, and the Institute's information and technical assistance services. Also discusses production of alginates from seaweed, use of seaweed meal in animal feedstuffs, and development of fertilizers from seaweed. Includes results of investigations on algal polysaccharides, biochemical studies on seaweeds, nitrogenous constituents of marine algae, and chemical composition of marine micro-algae; and a list of publications on seaweeds issued during 1963.

Cultivation of UNDARIA PINNATIFIDA (Harv.) Sur. (Wakame), by Yunosuke Saito, Fisheries Propagation

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Series No. 2, 40 pp., illus., printed in Japanese, February 15, 1964. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba Nishikubo, Minato-ku, Tokyo, Japan.

Seaweed Symposium, Proceedings, edited by Davy de Virville and J. Feldmann, 491 pp., illus., printed, 1964, $15. MacMillan Company, 60 Fifth Ave., New York, N. Y. 10011. Proceedings of the fourth international seaweed symposium, held at Biarritz, France, in September 1961.

SEROLOGY:

A Serological Approach to the Genus PSEUDOMONAS, by G. Hobbs and others, Torry Memoir No. 166, 12 pp., illus., printed. (Reprinted from The Journal of Applied Bacteriology, vol. 27, no. 1, April 1964, pp. 83-92.) Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

SHARKS:

Nuevos Tiburones para la Fauna del Peru (New Sharks among the Fauna of Peru), by Norma Chirichigno F., Serie de Divulgacion Cientifica 19, 20 pp., illus., printed in Spanish, 1963. Servicio de Pesqueria, Lima, Peru.

SHRIMP:

Clave para la Identificacion de los Camarones Marinos y de Rio con Importancia Economica en el Oriente de Venezuela (Key to the Identification of Marine and Fresh-Water Shrimp of Economic Importance in Eastern Venezuela), by Pierre Davant, Cuadernos Oceanograficos, vol. 1, 114 pp., illus., printed in Spanish and English. Instituto Oceanografico, Universidad de Oriente, Apartado de Correos 94, Cumana, Venezuela.

"Claves para identificacion de camarones peneidos de interes comercial en el Ecuador" (Identification key for commercial Ecuadorian Penaeid shrimp), by Harold Loesch and Quinto Avila, article, Boletin Cientifico y Tecnico, vol. 1, no. 2, May 1964, pp. 1-29, illus., printed in Spanish and English, single copy $1. Instituto Nacional de Pesca del Ecuador, Casilla 5918, Guayaquil, Ecuador.

Investigations of the Effect of Vacuum and Carbon Dioxide Packing on the Storage of Frozen Shrimp, by O. Karsti and D. Hakvag, Fiskeridirektoratets Skrifter, Serie Teknologiske Undersokelser, vol. 4, no. 1, 1961, 10 pp., illus., printed in Norwegian with English summary. Serie Teknologiske Undersokelser, Director of Fisheries, Bergen, Norway.

"On the location of a nursery ground of the giant prawn Macrobrachium rosenbergii (de Man)," by K. Raman, article, Current Science, vol. 33, no. 1, 1964, pp. 27-28, illus., printed. Current Science, Current Science Association, Balgalore, India.

Objections to the Proposed Validation under Plenary Powers of a Neotype for CANCER SETIFERUS L. 1767 (Crustacea, Decapoda), by Gordon Gunter, 4 pp., printed. (Reprinted from Bulletin of Zoological Nomenclature, vol. 21, part 3, August 1964, pp. 229-232.) International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Rd., London SW7, England.

A Provisional List of Experts Concerned with the Study of the Biology and Culture of Shrimps and Prawns, by H. Rosa, FAO Fisheries Biology Technical Paper No. 44, 11 pp., processed, 1964. Biology Branch, Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

"Shrimp conditions - 1964," by Lyle S. St. Amant, article, Louisiana Conservationist, vol. 14, nos. 9 and 10, September-October 1964, pp. 16-17, illus., printed. Louisiana Wild Life and Fisheries Commission, Wild Life and Fisheries Bldg., 400 Royal St., New Orleans, La. 70130. Summarizes the total shrimp production for the first half of 1964 in the Louisiana fishery, and production and conditions in the brown and white shrimp fisheries. Total shrimp production for 1964 is not expected to equal that of 1963 unless the white shrimp landings exceed those of last year. Total production for the first half of 1964 was about 12.2 million pounds as compared to 15.6 million pounds for the same period in 1963.

SMALL BUSINESS MANAGEMENT:

Long-Range Planning for Small Businesses, by Robert R. Milroy and others, Management Research Summary, 2 pp., processed, 1964. Small Business Administration, Washington, D. C. 20416. Long-term planning involves (1) setting up objectives, and (2) linking them to the present situation by a series of intermediate plans. A good way to reduce long-range plans to concrete form is to project financial statements for each year of the planning period. Those plans should be reexamined in the light of actual results at least once a year.

SMOKED FISH:

"Salting, preservation and processing of sea bass as an intermediate step in the production of smoked fish," by N. I. Sukrutov, article, Rybnoe Khoziaistvo, vol. 1, 1962, pp. 78-81, illus., printed in Russian. V. Krasnosel'skaia 17, B-140, Moscow, U.S.S.R.

Smoked Fish--Recommended Practice for Retailers, Torry Advisory Note No. 14, 5 pp., printed, 1963. Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

SMOKING:

Being the Second International Session on Advances in the Engineering of the Smoke Curing Process, Journal of Yugoslav Meat Industry Special Edition, 1962, 100 pp., printed. Yugoslav Institute of Meat Technology, Belgrade, Yugoslavia.

"Influence of seven factors of electrostatic smoking process on final quality of smoked products," by D. J. Tilgner and Z. E. Sikorski, article, Fleischwirtschaft, vol. 15, no. 5, 1963, pp. 391-415, printed in German. Die Fleischwirtschaft, Verlafshaus Sponholz GmbH, Kockstrasse 60-61, Berlin SW68, Germany.

Intensification of the Smoke Curing Process, by D. J. Tilgner. Department of Animal Products Technology, Politechnika Gdanska, Poland. Paper presented at First International Congress of Food Science and Technology, London, September 18-21, 1962.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

SNAIL:

"Immigrant snail is dinner delicacy," by Donald J. Zinn, article, Maritimes, vol. 8, no. 3, Summer 1964, pp. 15-16, illus., printed. Graduate School of Oceanography, University of Rhode Island, Kingston, R.I. Discusses the periwinkle (Littorina litorea), the common snail found abundantly along the New England coast; its history as a human food, introduction from its native European habitat, collection and storage, and methods of cooking.

SOUTH AFRICA REPUBLIC:

Census of the Fishing Industry, 1960-61, South Africa and South West Africa, Special Report No. 258, 34 pp., processed in Afrikaans and English, March 1963, 40 cents (about 56 U.S. cents). The Government Printer, Pretoria, Republic of South Africa. Contains the results of the first census of the South African and South-West African fisheries. Covers the commercial catching, landing, cleaning, salting, icing, sun-drying, and disposal of fish, but excludes factory processing. Includes statistical tables on fishing vessels by harbors; motor boats and trawlers by fishing districts; employment in the fisheries by districts; quantity and value of fish landed by districts; disposal of the catch; revenue; expenditure; assets; and capital expenditure.

Foreign Trade Regulations of the Republic of South Africa, OBR 64-92, 8 pp., printed, August 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D.C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Discusses South Africa's trade policy, import tariff, special customs provision, shipping document, labeling and marking requirements, nontariff import controls, export controls, United States' foreign trade controls, and diplomatic representation between the United States and that country. Also contains a section covering sales and other internal taxes.

SPAIN:

"Comentarios a la pesca española de 1963--la pesca de gran altura, principal factor del aumento pesquero" (Comments on the Spanish catch of 1963--the high seas fishery, principal factor in the growth of the fishing industry), article, Boletim de Informacion, no. 69, June 1964, pp. 11-16, printed in Spanish. Sindicato Nacional de la Pesca, Paseo del Prado, 18-20, 6ª Planta, Madrid, Spain.

Comercio y Consumo de Pesca (Fishery Trade and Consumption), 252 pp., illus., printed in Spanish, 100 ptas. (about US$1.65). Boletim de Informacion del Sindicato Nacional de la Pesca, 18-20 Paseo del Prado, Madrid, Spain.

"Exportacion de pescados, crustáceos y moluscos" (Exportation of fish, crustaceans, and mollusk), article, Informacion Conservera, vol. 12, no. 126, June 1964, pp. 236-238, printed in Spanish, single copy 30 ptas. (about 40 U.S. cents). Informacion Conservera, Colon, 62, Valencia, Spain. A reprint of the Resolution for General Direction of Foreign Commerce of June 10, for the regulation of export of fish, crustaceans, and molluscs.

"Han entregado en 1963, ochenta buques pesqueros" (In 1963, 80 fishing vessels have been delivered), article, Industrias Pesqueras, vol. 38, nos. 889-890, May 15, 1964, pp. 197, 199, illus., printed in Spanish. Industrias Pesqueras, Policarpo Sanz, 21-2, Vigo Spain.

Investigacion Pesquera, vol. 25, January 1964, 161 pp., illus., printed in Spanish with English summaries. Instituto de Investigaciones Pesqueras, Paseo Nacional, s/n, Barcelona-3, Spain. Includes, among others, articles on: "Nombres vulgares y científicos de las principales especies comerciales de crustáceos de Cadiz" (Common and scientific names of the principal commercial species of crustaceans at Cádiz), and "Biología del atún, Thunnus thynnus (L.), de la costa sudatlántica de España" (Biology of the tuna, Thunnus thynnus L., of the south Atlantic coast of Spain), by Julio Rodriguez-Roda.

Investigacion Pesquera, vol. 26, May 1964, 205 pp., illus., printed in Spanish with English abstracts. Instituto de Investigaciones Pesqueras, Paseo Nacional s/n, Barcelona-3, Spain. Contains, among others, these articles: "Talla, peso y edad de los atunes, Thunnus thynnus (L.), capturados por la almadraba de Barbate (costa sudatlantica de España) en 1963 y comparación con el período 1956 a 1962" (Length, weight, and age of the tuna, Thunnus thynnus, (L.) landed by the tuna fishing fleet of Barbate--South Atlantic coast of Spain--in 1963 and comparison with the period 1956 to 1962), by Julio Rodriguez-Roda; "Dinámica de la pesquería de sardina de castellón, datos de 1961 y 1962" (Dynamics of the sardine fishery of Castellon, between 1961 and 1962), by M. G. Larraneta and P. Suau; and "Variación estacional de la composición química, extracción y características del agar-agar de algunas algas (genero Gelidium) de la costa sudatlántica española" (Seasonal variation in the chemical composition, extraction, and characteristics of agar-agar of some algae--genus Gelidium--of the south Atlantic Spanish coast), by R. Establier.

"El nivel de produccion de las pesquerias en España" (The level of production in the Spanish fisheries), by V. Paz-Andrade, article, Industrias Pesqueras, vol. 38, nos. 889-890, May 15, 1964, pp. 193-195, illus., printed in Spanish. Industrias Pesqueras, Policarpo Sanz, 21-2, Vigo, Spain.

SPINY LOBSTER:

"Une interessante experience de peche a la langouste en Afrique du Sud" (An interesting experience in the spiny lobster fishery of South Africa), article, La Peche Maritime, vol. 43, no. 1036, July 1964, pp. 505-507, illus., printed in French, single copy 12 F. (about US$2.45). Les Editions Maritimes, 190, Boulevard Haussmann, Paris, France.

SPITZBERGEN:

The Fishery Characteristics of the West Spitsbergen Area, by T. S. Berger, Translation No. 35, 7 pp., processed, 1964. (Translated from the Russian, Nauchno-Tekhnicheskii Biulletin, PINRO, No. 1, 1961, pp. 45-49.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

SPRAT:

The Biology and Fishery of the Sprat in the Northern Part of the Baltic, by I. I. Kazanova, Trans. N. S. 19.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

19 pp., processed, 1963. (Translated from the Russian, Commercial Fishery Investigations in the Baltic, Trudy VNIRO, vol. 42, 1960, pp. 84-98.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

On the Long-Term Fluctuations in the Abundance of the Baltic Sprat as Related to the Fluctuations in the Productivity of Plankton, by I. I. Nikolaev, Translation Series No. 241, 23 pp., printed, 1959. (Translated from the Russian, Trudy Vsesoiuznovo Nauchno-Issledovatelskovo Instituta Morskovo Rybnovo Khoziaistva i Okeanografii (VNIRO), vol. 34, 1958, pp. 133-153.) Biological Station, Fisheries Research Board of Canada, St. Andrews, N.B., Canada.

The Sprat of the Black Sea, by N.E. Aslanova, Trans. N.S. 10, 7 pp., illus., processed, 1963. (Translated from the Russian, Trudy VNIRO, vol. 8, 1954, pp. 87-98.) Fisheries Laboratory, Ministry of Agriculture, Fisheries and Food, Lowestoft, Suffolk, England.

SQUID:

"The Newfoundland squid fishery in 1964," by V.M. Hodder, article, Trade News, vol. 17, no. 1, July 1964, pp. 16-18, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada.

STANDARDS:

"Codex Alimentarius," by Nathan Koenig, article, Foreign Agriculture, vol. 11, no. 38, September 21, 1964, pp. 3-4, illus., printed, single copy 20 cents. Foreign Agricultural Service, U. S. Department of Agriculture, Washington, D.C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.20402.) The development of trading areas throughout the world, improved transportation, and new food technology have all accelerated the pace of international trade in food, bringing about a new urgency for the establishment of standards that would facilitate world trade and also provide essential safeguards for protecting consumer health and insuring fair practices. Under the leadership of two United Nations groups--Food and Agriculture and World Health--an international code of food standards known as the Codex Alimentarius is being formulated. The FAO Fisheries Division assumed leadership for preparatory work in standards for fish and fishery products and last February convened a meeting of experts from 12 countries. The recommendations resulting from the meeting were to be among those considered at an October 1964 meeting of the Codex Alimentarius Commission.

Final Report of the Committee of Experts on International Standards for Fish and Fishery Products, 13 pp., processed, February 20, 1964. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. Contains information on a meeting of the committee held at FAO headquarters, Rome, February 18-20, 1964. The membership consisted of experts from 12 countries actively associated with international trade in fish and fishery products. The Committee carried out the following agenda items: recommendation of priorities among fish and fishery products to be standardized; preparation of a code of principles for fish and fishery products; and preparation of a draft model standard. Also included in the report are a list of participants and observers; a list of canned, frozen, and cured products given priority; a skeleton code of practice; and a suggested model standard.

STERN TRAWLING:

"Stern trawling fashionable," article, Fisheries Newsletter, vol. 23, no. 8, August 1964, pp. 24-26, illus., printed. Fisheries Branch, Department of Primary Industry, Canberra, Australia. Discusses, with the aid of diagrams, the operation of a stern trawler; the introduction of this vessel into most fishing countries; the differences between it and the conventional side trawler; and details of construction. Economic advantages of the stern trawler are: it saves up to half the time required by side trawlers to shoot and haul their gear; it saves time by fishing through weather which stops side trawlers; it saves wear, tear, and fuel by cutting out non-productive maneuvering; and it saves labor costs by controlling deck winches from the bridge and by mechanizing the fish-cleaning and gutting process.

Stern Trawling; a Record of the Stern Trawling Conference at Grimsby, England in September, 1963, edited by George Ward, 102 pp., printed, 1964. Fishing News (Books), Ltd., Ludgate House, 110 Fleet St., London EC4, England.

STORAGE:

Bulking, Shelving or Boxing? by J. J. Waterman, Torry Advisory Note No. 15, 13 pp., illus., printed, 1964. Torry Research Station, 135 Abbey Rd., Aberdeen, Scotland.

SUBMARINES FOR RESEARCH:

"Manned submersibles of the world," by John A. Pritzlaff and Richard E. Munske, article, Undersea Technology, vol. 5, no. 8, August 1964, pp. 20-26, illus., printed, single copy $1. Compass Publications Inc., 617 Lynn Bldg., 1111 N. 19th St., Arlington, Va. 22209. Reviews the programs under way and vehicles used for exploring and occupying the ocean's depths. The Bureau of Commercial Fisheries, among other agencies, has expressed a need for a 20-knot scientific submersible, capable of operating at 1,000-foot depths and remaining submerged up to 6 days at a time. Included are photos or drawings of 19 underwater vehicles currently operating or in the planning stages. Also included are specifications of the vehicles.

"Navíos y métodos para los trabajos submarinos" (Vessels and methods for submarine work), by G. Ortolan; "Submarinos de aluminio" (Submarines of aluminum), by Tomas de Galiana Mingot, articles, Puntal, vol. 11, no. 123, June 1964, pp. 3-7, 9, 11, illus., printed in Spanish, single copy 12 pesetas (about 20 U.S. cents). Puntal, Apartado de Correos 316, Alicante, Spain.

SWEDEN:

"Västkustfiskarnas pensionskassa håller årsmöte med 2.600 medlemmar" (Annual meeting of The Pension Fund of West Coast Fishermen with 2,600 members), article, Svenska Vastkustfiskaren, vol. 34, no. 15, August 10, 1964, pp. 300-301, printed in Swedish. Svenska Vastkustfiskarnas Centralforbund, Ekonomiutskottet Postbox 1014, Goteborg 4, Sweden.

SWITZERLAND:

"Unsere fischerei einst, jetzt und in zukunst" (Our fisheries--past, present, and future--Switzerland), by

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Fritz Funk, article, Schweizerische Fischerei-Zeitung, vol. 72, no. 8, August 1964, pp. 246-248, illus., printed in German. Schweizerische Fischerei-Zeitung, Anshelmstrasse 18, Bern, Switzerland. There are about 500 commercial fishermen in Switzerland today. They harvest a water surface area covering 135,000 hectares, consisting of lakes and streams. They produce about 1,500 tons of commercially valuable fish each year. To this can be added the take of about 120,000 male and female sport fishermen, which can be estimated at 600 tons a year.

--Walter Stolting

TAIWAN:

Foreign Trade Regulations of Taiwan, by Dawn A. Wachtel, OBR 64-89, 12 pp., printed, September 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D.C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.) Since Taiwan has few natural resources and cannot yet produce heavy machinery and equipment, imports of most industrial raw materials and capital goods are encouraged. The report discusses Taiwan's import tariff system, special customs provisions, internal taxes, shipping documents required, and labeling and marking requirements. Each also covers import licensing, Taiwan's export controls, United States foreign trade controls, and Government representation between the two countries.

TECHNOLOGY:

Fishery Technology, vol. 1, no. 1, January 1964, 161 pp., illus., printed. Fishery Technology, P.B. No. 39, Chittoor Rd., Ernakulam, India. The first issue of a new periodical to be published every six months by the Society of Fisheries Technologists (India). Contains, among others, these articles: "Impact of technology on Indian fisheries," by N. K. Panikkar; "Study of primary production and its importance in an integrated fisheries research programme," by R. Raghu Prasad; "Faecal indicator organisms in frozen prawn product," by A. Lekshmy and V. K. Pillai; "A rapid procedure for the approximation of bacterial load in fishery products," by Cyriac Mathen and others; "Studies on packaging of fresh fish," by C. V. N. Rao and P. A. Perigrien; "Design of a half ton dehydrator for fish," by M. Swaminath; "Preliminary experiments to evaluate the relative efficiency of different natural baits in line fishing," by R. Balasubramanyan; "The four seam trawl nets operated off Cochin--an analysis of the design aspects--the integration of the various parts of trawl," by R. S. Nair and N. A. George; "A note on proximate composition of tuna fish paste from Minicoy," by A. P. Valsan and others; and "On the use of natural baits for sea fishing in India," by R. Balasubramanyan.

TIDES:

"Precision digital tide gauge," by Frank E. Snodgrass, article, Science, vol. 146, no. 3641, October 9, 1964, pp. 198-200, 205-208, illus., printed, single copy 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

TILAPIA:

"Effectiveness of tilapia as live bait for skipjack tuna fishing," by Richard S. Shomura, article, Transactions of the American Fisheries Society, vol. 93, no. 3, 1964, pp. 291-294, printed. American Fisheries Society, 1404 New York Ave. NW., Washington, D. C 20005.

"Eizahl, eigewicht und gelegeentwicklung in der gattung Tilapia" (Egg number, egg weight and development of the spawn in the genus Tilapia), by Hans M. Peters, article, Internationale Revue der Gesamten Hydrobiologie, vol. 48, no. 4, 1963, pp. 547-576, printed in German with English summary. Internationale Revue der Gesamten Hydrobiologie, Berlin, Germany.

TOXICITY:

"The effect of the environment on the toxicity of poisons to fish," by R. Lloyd and D. W. M. Herbert, article, Journal of the Institution of Public Health Engineers, vol. 61, 1962, pp. 132-145, printed. Institution of Public Health Engineers, 118 Victoria St., Westminster, London SW1, England.

"Ostracitoxin: an ichthyotoxic stress secretion of the boxfish, Ostracion lentiginosus," by Donald A. Thomson, article, Science, vol. 46, no. 3641, October 9, 1964, pp. 244-245, printed, single copy 35 cents. American Association for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington, D. C. 20005.

"Seasonal variations of paralytic shellfish toxicity in the California mussel, Mytilus californianus Conrad, and the Pacific oyster, Crassostrea gigas (Thunberg), along the Strait of Juan de Fuca and in Willapa Bay," by Arporna Sribhibhadh, article, Dissertation Abstracts, vol. 24, no. 7, 1964, 3033, printed. University Microfilms, University of Michigan, 313 N. 1st St., Ann Arbor, Mich.

TRAWLING:

Introduction to Trawling, by A. Hodson, 77 pp., illus., printed, 1964. Fishing News (Books), Ltd., Ludgate House, 110 Fleet St., London EC4, England.

TRAWLS:

"Midwater trawls of one-boat types off Egersund," by A. Von Brandt, article, Hansa, vol. 99, no. 13, 1962, pp. 1383-1387, illus., printed in German. C. Schroedter und Co., 10 Stubbenhuk, Hamburg 11, Germany.

TROUT:

"Migration in Maine," by Paul J. Fournier, article, Natural History, vol. 73, no. 8, October 1964, pp. 46-49, illus., printed, single copy 50 cents. The American Museum of Natural History, Central Park W. at 79th St., New York, N. Y. 10024.

TUNA:

"Distribution of fishing effort and resulting tuna catches from eastern tropical Pacific Ocean, by quarters of the year, 1959-1962," by Franklin G. Alverson, article, Bulletin of the Inter-American Tropical Tuna Commission, vol. 8, no. 6, 1963, pp. 317-379, illus., printed. Inter-American Tropical Tuna Commission, La Jolla, Calif.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Exploring for tuna," Science News Supplement (11-1), Science News, vol. 11, no. 1, Fall 1964, 4 pp., illus., printed. Allyn and Bacon, Inc., 150 Tremont St., Boston, Mass. 02111.

"An increment technique for estimating growth parameters of tropical tunas, as applied to yellowfin tuna (Thunnus albacares)," by Enrique L. Diza, article, Bulletin of the Inter-American Tropical Tuna Commission, vol. 8, no. 7, 1963, pp. 381-416, illus., printed in Spanish and English. Inter-American Tropical Tuna Commission, La Jolla, Calif.

Katsuo to Maguro (Skipjack and Tunas), 33 pp., illus., printed, 1963. Federation of Japan Tuna Fishermen's Cooperative Associations and the Japan Tuna Fisheries Federation, 7-2, Hirakawa-cho, Chiyoda-ku, Tokyo, Japan. Contains tuna fishery statistics for the year 1962 including number and total tonnage of licensed tuna vessels; tuna catch by vessels based in Japan and in overseas bases, by species and by months; historical data on the mothership-type tuna fishery; export of canned and frozen tuna; utilization of the catch; and yearly average prices paid for different species.

Observations on the Commercial Potential of Tuna in the Oceanic Northwest Atlantic, by James L. Squire, Jr. and F. J. Mather, III, 10 pp., printed. (Reprinted from Gulf and Caribbean Fisheries Institute, 15th Annual Session, November, 1962, pp. 124-133.) Gulf and Caribbean Fisheries Institute, The Marine Laboratory, 1 Rickenbacker Causeway, Miami 49, Fla.

Report of the FAO Working Party for Rational Utilization of Tuna Resources in the Atlantic Ocean; First Session, Rome, 25-30 October, 1963, Fisheries Report No. 13, 23 pp., processed, 1963. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

Review of the (Japanese) Tuna Fishery (Katsuo-Maguro Sōran), compiled by Shoichi Masuda, 844 pp., illus., printed in Japanese, March 1964, 2,100 yen (about US$5.83) plus mailing charges. Suisansha, 8-banchi, Sanei-cho, Shinjuku-ku, Tokyo, Japan. Reviews the historical development of the Japanese tuna fishery and discusses in detail fishing gear and methods; fishing grounds; fishing vessels and equipment; processing methods; products; production, scale, and areas of operation of the home-based, mothership, overseas-based, and Atlantic tuna fleets; and fishing labor force and wage conditions. Also covers vessel loans and insurance; development of the canned tuna, frozen tuna, and tuna sausage industries; marketing and promotion of tuna products; market trends; marketing and sales organizations and their structure; inspection system and regulations; tuna fisheries policy before and after World War II; and international tuna problems.

--Lorry M. Nakatsu

"Some factors affecting the distribution and apparent abundance of yellowfin and skipjack tuna in the eastern Pacific Ocean," by Gordon C. Broadhead and Izadore Barrett, article, Bulletin of the Inter-American Tropical Tuna Commission, vol. 8, no. 8, 1964, pp. 417-473, illus., printed in Spanish and English. Inter-American Tropical Tuna Commission, La Jolla, Calif.

Statistical Research Report on the Tuna Long-Line Fisheries by Fishing Grounds, April-September 1962, 103 pp., illus., printed in Japanese. Research Division, Fisheries Agency, Ministry of Agriculture and Forestry, 2-1 Kasumigaseki, Chiyoda-ku, Tokyo, Japan. Describes the tuna fishing grounds in the Pacific Ocean, Indian Ocean, and Atlantic Ocean. Includes 6 figures (April-September) on distribution of fishing effort by five-degree squares for the three oceans; 24 figures on hooking rates of bluefin, albacore, big-eyed, and yellowfin tuna by months and oceans by five-degree squares; and 66 pages of tables on fishing effort (numbers of sets and numbers of hooks used) and fishing success (catch rate) of the four species of tunas and the swordfishes, by five-degree squares.

--Lorry M. Nakatsu

TUNA AND SARDINES:

"Coup d'oeil sur la pêche au thon et à la sardine en 1964" (A look at the tuna and sardine fisheries in 1964), by L. Plouas; "A Douarnenez--coup d'oeil sur les perspectives des campagnes thonière et sardinière" (Douarnenez--a look at the prospects for the tuna and sardine seasons); "A Concarneau--on ne pense pas que les stocks puissent gener l'écoulement du thon, mais la campagne sardinière est médiocre" (At Concarneau--one does not believe that the stocks will cause restriction of the sale of tuna, but the sardine season is mediocre); "A Lorient--assez bon debut des campagnes sardinière et thonière" (At Lorient--good enough beginning of the sardine and tuna seasons); articles, La Peche Maritime, vol. 43, no. 1036, July 1964, pp. 499-504, printed in French, single copy 12 F (about US$2.45). Les Editions Maritimes, 190, Boulevard Haussmann, Paris, France.

TUNA AND TUNALIKE:

"Northwest Atlantic tunas and bonitos," by S.N. Tibbo and R.A. McKenzie, article, Trade News, vol. 17, no. 2, August 1964, pp. 7-10, illus., processed. Information and Consumer Service, Department of Fisheries, Ottawa, Canada. A new Canadian fishery was started in 1963 when two fishermen from Campobello, N. B., began to fish the offshore stocks of tuna and bonito in the Northwest Atlantic. With two purse-seiners, they caught 366 tons of bluefin and skipjack between August 20 and the end of the season. This article discusses the development of the Atlantic tuna fishery and describes the 5 species of tuna (bluefin, yellowfin, big-eyed, albacore, and blackfin) and the 3 species of bonito (skipjack, common bonito, and false albacore) found in the Northwest Atlantic.

TURKEY:

Balik ve Balikcilik (Fish and Fishery), vol. 12, no. 6, June 1964, 35 pp., illus., printed in Turkish. Et ve Balik Kurumu G. M., Balikcilik Mudurlugu, Besiktas, Istanbul, Turkey. Contains, among others, articles on: "The sponge (Part V);" "Electrical depth telemeters which are used in fisheries especially for midwater trawl;" "Abundance and distribution of eggs and larvae of the anchovy in the Black Sea;" and "Marine products sold at the Istanbul fish market in 1963."

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Balik ve Balikcilik (Fish and Fishery), vol. XIII, illus., printed in Turkish with English table of contents. Et ve Balik Kurumu G. M., Balikcilik Mudurlugu, Besiktas, Istanbul, Turkey. Includes among others, articles on: "Territorial waters law, and "The sponges (Part VI)," July 1964, no. 7, 35 pp.; "Proteins in fish muscle and the influence of canning on the nutritive value of fish," and "Use of fish oils in the control of hypercholesteremia and obesity," August 1964, no. 8, 35 pp.; "Light and bioluminescence on living organisms (Part II)," "Synthetic filaments as utilized in the manufacture of fishing nets and ropes (Part I)," "The valuation of fish products in animal feeding and variations of product manufacturing process (Part I)," and "Observations of Ancona International Fishery Fair and Italy fisheries by technical point of views (Part II)," September 1964, no. 8, 35 pp.

UNDERWATER EXPLOSIVES:

Effects of Underwater Explosives on Aquatic Life, a Bibliography and List of Experts, FAO Fisheries Circular No. 2, 12 pp., processed, 1964. Fisheries Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

UNDERWATER OBSERVATIONS:

"A combined underwater camera and bottom grab: A new tool for investigation of deep-sea benthos," by Robert James Menzies, Logan Smith, and K. O. Emery, article, Internationale Revue der Gesamten Hydrobiologie, vol. 48, no. 4, 1963, pp. 529-545, printed. Internationale Revue der Gesamten Hudrobiologie, Berlin, Germany.

UNITED KINGDOM:

Scottish Sea Fisheries Statistical Tables, 1963, 50 pp., printed, 1964, 5s. 6d. (about US$1.10). Department of Agriculture and Fisheries for Scotland, Edinburgh, Scotland. (For sale by Sales Section, British Information Services, 845 Third Ave., New York, N. Y. 10022.) Contains 27 statistical tables showing quantity and value of fish landed in Scotland; quantity and value of herring and white fish processed; number of fishing vessels and fishermen; and number of vessels and fishermen and quantity and value of fish landed in creeks.

UNITED STATES GOVERNMENT:

Report of the United States Government to the Food and Agriculture Organization of the United Nations, 1961-63, 100 pp., processed, July 1964. U. S. Department of Agriculture, Washington, D. C. 20250. A report prepared under auspices of the U. S. FAO Interagency Committee in accord with Article XI of the FAO Constitution. Relates the most significant progress and developments during the period under review in the fields of FAO's activities in regard to the three basic objectives of FAO: (1) raising levels of nutrition and living standards; (2) securing improvement in the efficiency of production and distribution of food and agricultural products; and (3) bettering the condition of rural populations. Also outlined are the main problems still outstanding in those fields. The report contains sections on nutrition and home economics, farming in the United States, advances in agricultural research and technology, soil and water conservation, and marketing farm products. It also covers rural living, forestry, information activities, international trade and assistance, and multilateral international activities. A section on fisheries discusses the scope of the United States fishing industry, species and major fishing areas, fishing vessels and gear, processing, imports and exports, per capita consumption of fishery products, and marketing. Information is also included on research developments in technology, exploratory fishing, and biology and oceanography; subsidies, loans, and mortgage insurance programs; the eight international fishery commissions of which the United States is a member; and principal problems--competition from other domestic protein foods, competition from foreign products, safe habitat for fishery resources, downward trend in catches of some major species, and decisions of several countries to increase their territorial fisheries jurisdiction.

U.S.S.R.:

Biological Fishery Research in Siberia, by B. G. Ioganzen, JPRS 19772, 25 pp., processed, 1962. (Translated from the Russian, Voprosy Ikhtiologii, vol. 2, no. 1 (22), pp. 3-17.) Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

Fauna and Flora of the Rivers, Lakes and Reservoirs of the U.S.S.R., by V. I. Zhadin, OTS 63-11166, 626 pp., processed, 1963. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

The Fishing Industry of the U.S.S.R., by H. Sakiura and others, Overseas Series No. 4, 80 pp., printed in Japanese, March 25, 1964. Japan Fisheries Resources Conservation Society, Futaba Bldg., 24, Sakurakawa-cho, Shiba-Nishkubo, Minato-ku, Tokyo, Japan.

Notes from Soviet Fisheries Journals, by Donald E. Bevan and Ole A. Mathisen, Circular No. 296, 41 pp., illus., printed, 1964. Fisheries Research Institute, College of Fisheries, University of Washington, Seattle, Wash.

The Postwar Expansion of Russia's Fishing Industry, by Leon M. Herman, 59 pp., printed, 1964. Committeè on Commerce, United States Senate, Washington, D. C. (Available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

"Rybnoe khozyaistvo estestvennykh vodoemov Voronezhskoi oblasti v 1958-1960 (The fishing industry in natural bodies of water of the voronezh Oblast' in 1958-1960)," by A. V. Fedorov and E. V. Afonyushkina, article, Referativnii Zhurnal Biologiia, 1963, 20183, printed in Russian. Akademiia Nauk SSSR, Institut Nauchnoi-Informatsii, Moscow, U.S.S.R.

VESSELS:

"Statki rybackie dla malych portów polskiego whbrzeza. Czesc II" (Fishing vessels for Poland's small fishing harbours. Part II), by Bohdan Pradzynski, article, Budownictwo Okretowe, vol. 9, no. 8, August 1964, pp. 271-273, illus., printed in Polish. Wydawnictwa Czasopism Technicznych NOT, Warsaw Czachkiego 3/5, Poland.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

Structural Research of Small Wooden Fishing Vessels, 29 pp., printed, 1964. Danish Wood Council, Copenhagen, Denmark.

WEATHER CHARTS:

Coastal Warning Facilities Chart, Morgan City, La., to Brownsville, Texas, 1964, 2 pp., processed, 1964. 10 cents. Weather Bureau, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.) Shows stations displaying small craft, gale, whole gale, and hurricane warnings, explanations of warning displays, and schedules of AM and FM radio, TV, and radiophone stations that broadcast weather forecasts and warnings.

WHALING:

"International Whaling Commission, Sixteenth Annual Meeting," article, Norsk Hvalfangst-Tidende (The Norwegian Whaling Gazette), vol. 53, no. 7, July 1964, pp. 208-209, printed. Hvalfangerforeningen, Sandefjord, Norway.

"The world catch, 1963," article, Norsk Hvalfangst-Tidende (Norwegian Whaling Gazette), vol. 53, no. 7, July 1964, pp. 194-207, illus., printed in Norwegian and English. Hvalfangerforeningen, Sandefjord, Norway. Contains world whaling catch statistics for 1963, together with a discussion of landings by areas and countries, presented to the 16th meeting of the International Whaling Commission in June 1964. Included are tables on whaling in fields outside the Antarctic in 1963 and in Antarctic season 1962/63; whaling results for the various countries; production of byproducts; Antarctic landings, 1951-63; and other related data.

WHITING:

"On the biology of the whiting Gadus merlangus L. in Manx waters," by A. K. Nagabhushanam, article, Journal of the Marine Biological Association of the United Kingdom, vol. 44, no. 1, 1964, pp. 177-202, illus., printed. Cambridge University Press, 200 Euston Rd., London NW1, England.

Regional and Annual Variations in the Growth of Whiting (GADUS MERLANGUS Linne), by Lennart Hannerz, Series Biology, Report No. 14, 64 pp., printed, 1964. Carl Bloms Boktryckeri, Lund, Sweden.

YUGOSLAVIA:

Basic Data on the Economy of Yugoslavia, by Arthur J. Laemmerzahl, OBR 64-83, 16 pp., illus., printed, July 1964, 15 cents. Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402.) Discusses the country's geography, population and Government; economic structure; industrial sectors; financial institutions; foreign trade; Government role in the economy; and economic outlook. Also contains a section covering the labor force, wages, and unemployment.

AUSTRALIAN PEARL-CULTURE INDUSTRY DEVELOPING

The Australian pearl-culture industry (started in 1956) is still developing. There are now 11 culture farms scattered across Northern Australia from Exmouth Gulf to Torres Strait, in various stages of production, and they employ 82 Japanese and 153 Australians.

Pearls are being cultured in the large Australian pearl oyster (*Pinctada maxima*) which can produce a round pearl up to 18 mm. in diameter in from 2 to 3 years--about half the time it takes in Japan where the culturing technique was perfected. The Japanese culture the small Akoya oyster (*Pinctada martensii*) which produces a pearl up to 11 mm. in diameter in 4 to 7 years.

Japan has 3,000 culture farms which in 1963 produced 79 metric tons of pearls for export, worth £A23 million (US$1.5 million). The United States, Switzerland, West Germany, and Hong Kong are the principal buyers.

Australian cultured pearls are sent to Japan where rounds are graded and half rounds processed, then re-exported to world markets. (*Australian Fisheries Newsletter*, June 1964.)


Season's
Greetings

COMMERCIAL FISHERIES REVIEW

INDEX for 1964

—Volume 26—

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

FISH AND WILDLIFE SERVICE
CLARENCE F. PAUTZKE, COMMISSIONER

BUREAU OF COMMERCIAL FISHERIES
DONALD L. MCKERNAN, DIRECTOR

DIVISION OF RESOURCE DEVELOPMENT
RALPH C. BAKER, ASST. DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
G. A. Albano and H. Beasley, Assistant Editors

Address correspondence and requests to the: Chief, Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, May 1, 1963.

5/31/68

An index of Volume 26, Numbers 1 through 12, issued in 1964. It is a subject index, with an author index for only the feature articles in each monthly issue. Indexing of other material is based on the principal subject with some cross-reference. The use of "_____" in entries denotes the omission (repetition) of the major subject heading which appears in ALL CAPS.

Actions in Congress affecting or of interest to commercial fisheries are indexed only once by subject under the general heading: "CONGRESS, EIGHTY-EIGHTH (First Session)," i.e., there is no cross-reference indexing of those entries.

Publications listed in the "Recent Fishery Publications" section have not been indexed.

- - - - - - - - -

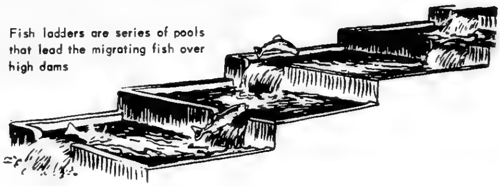
Back issues of Volume 26, Numbers 1 through 12, are still available until the supply is exhausted. Copies are available free upon request from the Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 No. Fort Myer Dr., Rm. 510, Arlington, Virginia 22209.

INDEX TO VOLUME 26 (NUMBERS 1-12 INCLUSIVE)--1964

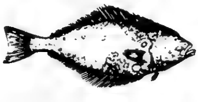
The reference gives the month and the page number

Issued May 1965

Fish ladders are series of pools that lead the migrating fish over high dams

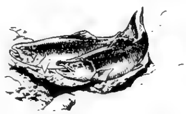


WHAT MAN MUST KNOW ABOUT FISH

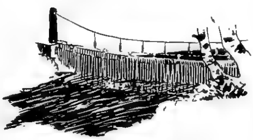


The flat-bodied halibut spends most of its life buried in the sand on the ocean floor

The brilliantly colored tilefish lives in northern waters although it belongs to a tropical family



Salmon on their nest



Electrical barriers stop adult lampreys moving upstream to spawn

Men have been fishing for thousands of years but know comparatively little about fish and what affects their abundance and movements. "Sea culture" is a new science and the restlessness of the ocean complicates our efforts to unlock its secrets.

The supply of fish in the ocean is not inexhaustible and Man must practice conservation in the sea just as he is beginning to practice conservation on the land.

When, where, and how many.--A most important fact the fishery conservationist must learn is the "maximum sustainable yield" of each species--that is, the greatest number that can be harvested each year yet leave enough for harvesting the next year and the next. The conservationist must also predict when and where the fish are available to the fishermen. The fishermen can then prepare for big or small harvests as conditions warrant. "Predicting abundance" is a primary objective of fishery scientists since it provides a basis for regulating the catch and can be an important factor in increasing fishing efficiency.

How, how, and how.--But knowing "when, where, and how many" is only part of the work of the fishery conservationist. He must be able to tell the fishing industry *how* to make the best possible catch without damage to the resource; *how* to get high-quality fishery products to the family table at a reasonable price; and *how* to make the best use of fish for industrial purposes.

Intriguing mysteries.--Solving these problems include finding the reason why a species such as the tilefish suddenly disappears from its haunts and is missing for years to reappear suddenly in great numbers; the reason for heavy mortality of a species when known conditions appear normal; the "spark" which causes the "red tide" organism to suddenly increase in numbers, killing millions of fish.

Some recognized dangers.--Predators, such as squawfish awaiting young salmon at a river mouth; starfish and drills ruining an oyster harvest; green crabs killing clams; sea lamprey attacking the Great Lakes trout, must be controlled. Obstructions, such as dams blocking fish runs; irrigation outlets and power turbine intakes diverting fish from their course, must be bypassed. Silt that covers spawning grounds and shellfish beds or ruins growth of aquatic plants by making the water too murky for sunlight to penetrate; water fluctuations that drown out or dry up spawning areas; domestic and industrial pollution; careless use of pesticides, all pose problems of great concern to the conservationist.

--Conservation Note 2,
Commercial Fisheries of the United States (Revised Aug. 1964), U. S. Fish and Wildlife Service, Washington, D. C. 20240.


FISHERY MARKET NEWS
PRICES, RECEIPTS, LANDINGS, AVAILABLE
the same day!
a.m.
p.m.

COMMERCIAL FISHERIES REVIEW

VOL. 26, NO. 11a

NOVEMBER 1964 - SUPPLEMENT

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

FISH AND WILDLIFE SERVICE
CLARENCE F. PAUTZKE, COMMISSIONER

BUREAU OF COMMERCIAL FISHERIES
DONALD L. MCKERNAN, DIRECTOR

DIVISION OF RESOURCE DEVELOPMENT
RALPH C. BAKER, ASST. DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
G. A. Albano and H. Beasley, Assistant Editors

Address correspondence and requests to the: Chief, Fishery Market News Service, U. S. Bureau of Commercial Fisheries, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, May 1, 1963.

5/31/68

CONTENTS

COVER: An unprecedented growth of the Soviet Pacific fishing fleet is taking place. During 1960-63, the Soviet Government added to that fleet over 200 modern fishing, fish-processing, whaling, and support vessels. Shown is a vessel of the Skryplev class. Designated a refrigerator transport, it is virtually a factoryship that can freeze fish and manufacture fish meal and oil. A distinctive feature of this vessel is a stern ramp fitted with a gate which can be closed.

COMMERCIAL FISHERIES REVIEW

November 1964 - Supplement | Washington, D. C. | Vol. 26, No. 11a

SOVIET FAR EAST FISHERIES EXPANSION

By Milan A. Kravanja*

ABSTRACT

Fisheries are today the most important industry in the Soviet Far East, an Economic Region encompassing all coastal provinces between Siberia and the Pacific. This prominence was achieved with the help of a generous investment program, which has resulted in greatly increased fishery landings. From 1950 to 1963, the production of fish and other aquatic animals rose by 313 percent to 1.5 million tons, an all-time record. This increase was accelerated during the last 4 years by additions of over 200 large modern fishing, fish-transporting, and fish-processing vessels. A large whale-hunting fleet was also created. The article describes 13 recently added Soviet vessel types in considerable technical detail. Statistical tables, maps, and photographs accompany the text.

BACKGROUND

Fishing is the most important industry in the Soviet Far East (fig. 1). In 1962 the value of the gross output from the Far East fisheries amounted to nearly 1 billion rubles (US$1.1 billion1/). This value was almost 30 percent of the value of the total industrial output in the Soviet Far East. The Far East fisheries are today a vast complex of fishing fleets, port facilities, and shore-based processing plants served by thousands of fishermen, longshoremen, and industrial workers. All is directed by a single regional administrative body, the Main Administration of Far East Fisheries.

Increased Soviet Far East fishery landings were made possible by a generous capital investment program. Like in all other Soviet industries, overall policy and programs for the fishing industry are determined by the central government in Moscow. The five-year plans for 1946-50 and 1951-55 allocated to the Far East Region nearly 35 percent of the total Soviet investment in the fishing industry--of the $1.3 billion provided during that 10-year period, the Far East received $461,000,000 (table 1). The seven-year plan for 1959-65 shows a striking increase in capital investment, with $2.2 billion allocated to the entire Soviet fishing industry; by 1965 the Far East will have received $728.7 million (or 33 percent of the total). The principal beneficiary of current increased investment outlays is the Maritime Province (Primorskii Krai), situated near Mainland China. This area's annual fishery investments increased from $8.9 million allocated during the 1951-55 5-Year Plan, to $69.4 million during the current 7-Year Plan, or by almost 700 percent.

Table 1 - Capital Investment in the Soviet Fishing Industry, 1946-55 and 1959-65

Region and Province	1959-65	1951-55	1946-50
	. . . . (Millions of US$)		
Far East Region:			
Primorskii Krai	485.2	44.6	27.9
Kamchatka Oblast' . . .	150.9	101.1	54.8
Sakhalin Oblast'	79.3	97.7	55.7
Other provinces	13.3	47.6	31.4
Total Far East	728.7	291.0	169.8
Other regions	1,506.6	545.2	322.3
Total U.S.S.R. . . .	2,235.3	836.2	492.1

Note: In converting Soviet internal rubles into U. S. dollars, the so-called official Soviet conversion rate of U.S.S.R. ruble 1.00 = US$1.10 has been used.
Source: Mikhailov 1962.

FISHERY ADMINISTRATION

Until 1959, the fishing industries of the Far East administrative provinces were controlled by local Economic Councils (Sovnarkhozes), as were other Far East industries. Lack

*Foreign Fisheries Specialist, Branch of Foreign Fisheries, U. S. Bureau of Commercial Fisheries, Washington, D. C.

1/In converting Soviet internal rubles into U.S. dollars, the so-called official Soviet conversion rate of USSR ruble 1.00 = US$1.10 has been used.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 714

of centralized control led to many difficulties. Exploratory fishing efforts, for example, were duplicated by provinces. Shore processing facilities were overloaded in one province, while installations in other provinces remained idle. The Far East fishing industry was reorganized at the end of 1959, and centralized control was given to a new organization--the Main Administration of Far East Fisheries (Glavnoe Upravlenie Dal'nevostochnoi Rybnoi Promyshlennosti, usually abbreviated in Soviet writings to Glavdal'vostokrybprom). The Main Adminisministration, located at Vladivostok, is responsible to the Council of Ministers of the Russian Soviet Socialist Republic and to the Federal Committee on Fisheries, both in Moscow. This centralization has been found so effective in increasing production, that in 1962 the Soviet Union also reorganized its European-based fisheries into four major fishery administrations.

Fig. 1 - The Soviet Far East Region (Sovetskii Dalnii Vostok) is composed of 6 administrative units, 5 of which are contiguous to seas rich in fishery resources. It belongs administratively to the Russian Soviet Federative Socialist Republic (R.S.F.S.R.) which stretches from the Barents, Baltic, and Black Seas to the shores of the Sea of Japan, the Sea of Okhotsk, and the Bering Sea.

FAR EAST FISHERY CATCH

In 1963, the Far East Region produced about one-third of the total Soviet fishery landings of 4,670,000 metric tons (table 2). Official U.S.S.R. fishery statistics give a breakdown by Soviet republics, but the Russian Soviet Socialist Republic includes all major Soviet fishing areas and it is impossible to determine Far East marine landings from those figures alone. Analysis of current Soviet writings on economics, however, has supplied statistical data which are not publicly available from the Soviet Federal Committee on Fisheries (the equivalent of the U.S. Bureau of Commercial Fisheries).

Far East marine landings show significant changes since 1950, when about 370,000 tons were caught. By 1963, landings had increased fourfold to an estimated 1,530,000 tons. Soviet Far East landings have been expanding at a greater rate than total U.S.S.R. landings. In 1950

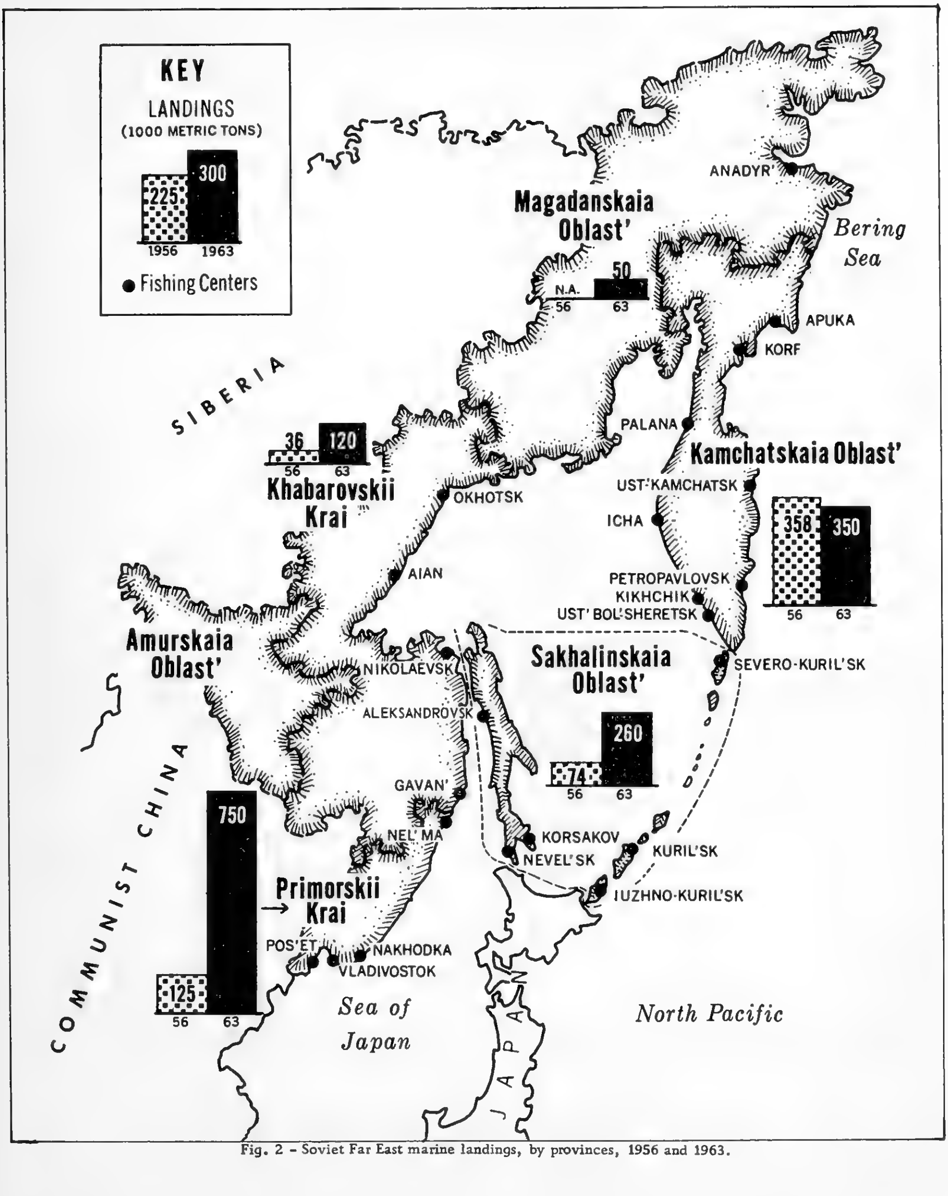


Fig. 2 - Soviet Far East marine landings, by provinces, 1956 and 1963.

the Far East accounted for 21.1 percent of total Soviet landings, and in 1963 for 32.8 percent. This reflects to a large extent the priority attention being given by Soviet planners to expanding the Far East fisheries.

The U.S.S.R. is planning for a Far East production of 1,660,000 metric tons of fish and other aquatic products in 1965. There is little doubt that this goal will be reached and probably surpassed. Within the last decade, Soviet Pacific fisheries have undergone a significant transformation. In 1950, coastal and inshore fishing dominated, and only 34 percent of all Far East landings were obtained from offshore areas. By 1960, offshore fisheries accounted for 82 percent of all Far East landings. According to Margolin (1963), offshore operations may soon produce up to 94 percent of all Pacific fishery catches. So far, U.S.S.R. distant offshore operations from Far East ports have been almost entirely in the Bering Sea and southeastward into the Gulf of Alaska. Recent developments indicate that Soviet vessels in the Far East plan to fish on a large commercial scale in the Central and South Pacific, the East and South China Seas, and the Indian Ocean.

Table 2 - U.S.S.R. and Far East Fishery Landings, 1950 and 1956-63

Year	Total U.S.S.R. Landings1/	Far East Landings1/	Far East Percentage of Total
	. . . (1,000 Metric	Tons) . . .	%
1963	4,670	1,530	32.8
1962	4,167	1,203	28.9
1961	3,724	2/	2/
1960	3,541	860	24.3
1959	3,075	2/	2/
1958	2,936	846	28.8
1957	2,761	2/	2/
1956	2,849	593	20.8
1950	1,755	370	21.1

1/Includes fish, shellfish, and aquatic mammals.
2/Not available.
Sources: Tsentral'noe Statisticheskoe Upravlenie Pri Sovete Ministrov USSR (Central Statistical Administration of the U.S.S.R. Council of Ministers) 1963, 1964.

The Far East Region (fig. 2) is divided into six administrative provinces (designated in Russian as an oblast' or krai). With the exception of Amur Province, all provinces conduct marine fisheries in the North Pacific, including the Sea of Okhotsk and the Bering Sea. Sakhalin Province contains the former Japanese prefecture of Karafuto (southern half of Sakhalin Island) and the Kuril Islands. Fishery development in the Far East Region has progressed at different rates in the different provinces.

Primorskii Krai or the Maritime Province has increased landings sixfold during the last eight years. In 1963, the catch of 750,000 metric tons accounted for almost one-half of Far East landings (table 3 and fig. 2). This rapid increase is partly due to the buildup of whale and crab fleets operating from the ports of Vladivostok and Nakhodka at the southernmost tip of the Far East Region. Also, Primorskii Krai has been allocated the largest number of new vessels. Of the 21 Maiakovskii-class large stern trawlers added during 1960-63 to the Soviet Pacific fleet, 13 were allotted to Primorskii Krai and only 4 each to Kamchatka and Sakhalin Provinces.

Table 3 - Soviet Far East Marine Landings, by Provinces, 1956, 1960, and 1963

Administrative Divisions	1963 Quantity	1963 Percentage of Total	1960 Quantity	1960 Percentage of Total	1956 Quantity	1956 Percentage of Total
	1,000 Metric Tons	%	1,000 Metric Tons	%	1,000 Metric Tons	%
Primorskii Krai . . .	750	49	344	40	125	21
Kamchatka Oblast' .	350	23	215	25	358	60
Sakhalin Oblast' . .	260	17	172	20	74	13
Khabarovsk Krai . .	2/120	2/8	{ 129	{ 15	36	6
Magadan Oblast' . .	2/ 50	2/3			1/	1/
Total	1,530	100	860	100	593	100

1/Not available. Magadan Oblast' was formed only in December 1953 and no statistical data are available for the first few years of its existence. Landings in 1956 are believed to have been negligible.
2/Estimated
Sources: Garfield 1959; Margolin 1963; Melnikov and Sal'nikov 1962.

Kamchatka, traditionally the richest Soviet Far East fishing province, has declined in relative importance. In 1956, about 358,000 metric tons (60 percent of Far East marine landings) were produced by that province. In 1963, production was about the same, but constituted only

23 percent of Soviet marine landings in the Far East. This has produced a certain restlessness among responsible officials of the province, which is understandable since the fishing industry provides 70 percent of Kamchatka's total gross product. In June 1963, the Secretary of the Communist Party for Kamchatka Oblast' wrote a caustic review of the local fishing industry, and stated that "one would think that it would be logical to keep Kamchatka in at the top of the list when fishing vessels are distributed. However, this is not so; they are sent mainly to areas where both landings and productivity are at a considerably lower level." Kamchatka imports 6 to 7 metric tons of industrial and consumer goods for each ton of fishery catch produced. Consequently, the central government wants to diversify Kamchatka's industries, and it is likely that the importance of her fishing will decline further. Nevertheless, a goal of 500,000 tons of fishery landings by the end of 1965 has been set, although this will probably not be reached.

Landings in Sakhalin Province have increased from 74,000 metric tons in 1956 to 260,000 tons in 1963. Mainly responsible for the increase has been participation in the Bering Sea and the Gulf of Alaska flounder, herring, and ocean perch fisheries, and intensified saury fishing (with electric lights and suction pumps) in the Northwest Pacific near the Kuril Islands. In 1963, over 70,000 metric tons of saury were landed; the 1965 goal is 200,000 tons.

Little is known about Khabarovsk and Magadan Provinces, except that Amur River salmon constitute over 10 percent of Khabarovsk marine landings. The low rate of investment in the fisheries of those two provinces is partly responsible for the reportedly nominal increase

Table 4 - Known Additions to the Soviet Far East Fishing Fleet, by Type, Class, and Country of Construction, 1960-63

Type and Class of Vessel	Country of Construction	Number of Vessels				
		1963	1962	1961	1960	Total
Medium trawlers:						
SRT	U.S.S.R.	2/	1/20	1/10	1/10	1/40
Okean	East Germany	4	3	4	3/ 5	16
Stern trawlers:						
Maiakovskii	U.S.S.R.	12	3	4	2	21
Tropik	East Germany	1	-	-	-	1
Motherships (herring):						
Severodvinsk	Poland	-	2	2	1	5
Factoryships:						
Zakharov	U.S.S.R.	2	1	1	1	5
Refrigerator transports:						
Bratsk	East Germany	1	3	4	-	8
Tavriia	U.S.S.R.	-	1	2	1	4
Pervomaisk	Denmark	-	-	1	1	2
Sevastopol	U.S.S.R.	2	1	-	-	3
Skryplev	Denmark	2	1	-	-	3
Whaling fleet:						
Sovetskaia Rossiia	U.S.S.R.	-	1	-	-	1
Vladivostok	West Germany	2	-	-	-	2
Catcher boats	U.S.S.R.	4/ 3	7	13	4	27
Support vessels:						
Tankers	2/	1	1	2	1	5
Repair ships	2/	2/	1	-	1	2
Floating docks, large	2/	2/	1	1	-	2
Floating docks, small	2/	2/	1	1	1	3
Salvage tugs	Finland	1	2/	2/	2	3
Water carriers	Finland	1	2	1	2/	4
Total		1/32	1/49	1/46	1/30	1/157

1/Estimated.
2/Not available.
3/Includes some 1959 deliveries.
4/Includes only catchers added to the Sovetskaia Rossiia whaling fleet. The Soviets operate three additional whaling fleets in the Pacific.
Note: Not included are smaller types of fishing craft, such as small and medium seiners, and vessels of the seal and walrus-hunting fleet.

in landings. From 1959 through 1965, the U.S.S.R. will have invested only the equivalent of US$13.3 million in the Magadan, Amur, and Khabarovsk Provinces. This is barely 0.6 percent of the total Soviet investment in the Far East fisheries (table 1).

FAR EAST FISHING FLEET

Increased Far East landings are mainly the result of an unprecedented growth in the Soviet Pacific fishing fleet. During 1960-63, the Soviet Government supplied the Main Administration of Far East Fisheries with over 200 modern fishing and support vessels--an estimated 500,000 gross tons. Data have been compiled from many sources on specific details regarding 157 of the larger vessels, totaling 410,020 gross tons. Table 4 gives the type and class of vessels built, the country of construction, and the year when the vessels were added to the Far East fleet. Table 5 gives the average and total gross tonnages of the new vessels.

Table 5 - Known Additions to the Soviet Far East Fishing Fleet, by Type, Class, and Gross Tonnage, 1960-63

Type and Class of Vessel	Average Gross Tonnage	Total Gross Tonnage 1963	1962	1961	1960	Grand Total
Medium trawlers:						
SRT	260	2/	1/5,200	1/2,600	1/2,600	1/10,400
Okean	505	2,020	1,515	2,020	2,525	8,080
Stern trawlers:						
Maiakovskii	3,170	38,040	9,510	12,680	6,340	66,570
Tropik	2,600	2,600	-	-	-	2,600
Motherships (herring):						
Severodvinsk	10,000	-	20,000	20,000	10,000	50,000
Factoryships:						
Zakharov	12,675	25,350	12,675	12,675	12,675	63,375
Refrigerator transports:						
Bratsk	2,500	2,500	7,500	10,000	-	20,000
Tavriia	3,230	-	3,230	6,460	3,230	12,920
Pervomaisk	3,300	-	-	3,300	3,300	6,600
Sevastopol	5,525	11,050	5,525	-	-	16,575
Skryplev	4,700	9,400	4,700	-	-	14,100
Whaling fleet:						
Sovetskaia Rossiia	33,150	-	33,150	-	-	33,150
Vladivostok	17,150	34,300	-	-	-	34,300
Catcher boats	850	2,550	5,950	11,050	3,400	22,950
Support fleet:						
Tankers	4,000	4,000	4,000	8,000	4,000	20,000
Repair ships	3,000	2/	3,000	-	3,000	6,000
Floating docks, large	2,500	2/	2,500	2,500	-	5,000
Floating docks, small	400	2/	400	400	400	1,200
Salvage tugs	1,000	1,000	2/	2/	2,000	3,000
Water carriers	3,300	3,300	6,600	3,300	2/	13,200
Total	-	136,110	125,455	94,985	53,470	1/410,020

1/Estimated.
2/Not available.

The additions to the Far East fleet in tables 4 and 5 were all vessels destined for distant offshore operations. Half of the 157 vessels specifically identified were medium trawlers (260 to 505 gross tons in size) and stern trawlers (2,600 to 3,200 gross tons); however, they accounted for only 21 percent of the gross tonnage. Motherships to store herring and factoryships to process fish and crabs were other important additions to the fleet. During 1960-63, known additions of motherships and factoryships to the Pacific fleet were 10, totaling 113,375 gross tons. The Soviets have recognized the need for all types of support to distant offshore fishing. Refrigerator transports, tankers, repair ships, floating docks, tugs, and water carriers give strong and vital support to fishing operations and the handling and processing of fish and shellfish. Nearly 40 such known additions, totaling 118,595 gross tons, were made to the Far East fishing fleet during 1960-63.

Major additions were also made to the whaling fleet. Three factoryships (totaling 67,450 gross tons) and 27 catcher boats (totaling 22,950 gross tons) were allotted to the Far East fleet.

The Soviets have relied on foreign shipyards for building a large part of their Far East fishing fleet. Of the known tonnage added to the fleet during 1960-63, an estimated 225,940 tons (55 percent) were constructed in the U.S.S.R. The remaining 184,080 gross tons were built in Poland (50,000 gross tons), West Germany (34,300 tons), East Germany (30,680 tons), Denmark (20,700 tons), Finland (16,200 tons), and unidentified countries (32,200 tons).

The trend in the Soviet Far East fisheries has been toward building vessels of larger tonnage. In 1960, the average gross tonnage of the 30 vessels added to the fleet was 1,782. The average tonnage increased each succeeding year--2,065 tons in 1961, 2,560 tons in 1962, and 4,253 tons in 1963. During 1960-62, medium trawlers were added in larger numbers. The sharp increase in average tonnage in 1963 can be attributed to the addition of 13 stern trawlers, compared with 9 during the previous three years; also, two new whale factoryships were added to the fleet.

Below are given descriptions of the classes of vessels added to the Soviet Far East fishing fleet during 1960-63. The data given are generally for the first vessel built in a class; subsequent additions to a class may have considerable modifications to improve efficiency of operation. Information is not available on the specifications of the whale catcher boats and support vessels assigned to the Far East fishing fleet.

MEDIUM TRAWLERS: During 1960-62, the following two classes of medium fishing trawlers (SRT--Srednii Rybolovnii Trauler) were added to the Soviet Pacific fishing fleet:

1. Without refrigeration (SRT): This class of medium trawler (fig. 3) is the most numerous of the fishing vessels in the Pacific offshore fleet. An estimated 500 to 600 SRT's participate in Soviet Far East fishing operations. Forty were delivered during 1960-62; data are not available on 1963 deliveries. SRT's have been constructed in the U.S.S.R.; they were also built in East Germany until 1959. The more recently built SRT's are about 260 gross tons in size, about 130 feet in overall length, carry a crew of 15, and have a cargo capacity of about 200 metric tons. The German-made SRT can only carry about 120 tons. In recent years, an estimated 50 SRT's were equipped with refrigeration plants and the ultimate plan of the Main Administration of Far East Fisheries is that all of its SRT's be refrigerated.2/

Fig. 3 - Trawler of SRT class. Vessel has no refrigeration equipment.

2. With refrigeration (Okean class): Built in East Germany, Okean motor vessels (also known as SRT-R or Srednii Rybolovnii Trauler Refrizheratornii) are conventional side trawlers, but also carry two boats for gill-net and ring-net fishing (fig. 4). Sixteen of these vessels were delivered during 1960-63. The vessels are 167 feet in overall length, 505 gross tons in size, and have a crew of 26. The fish caught (principally herring) are usually salted, packed in barrels, and stored in refrigerated holds at -4° C. (25° F.). The Okean-class vessels can work independently for 40 days at unlimited distances from shore; in the North Pacific, however, they are employed for months at a time as part of fishing fleets.

Equipment includes Soviet-manufactured radar, gyrocompass, radio-direction finder, and depth-determining echo-sounder (maximum depth 4,000 feet). A horizontal-vertical sounding

2/Communication by Mr. Winthrop A. Haskell, Fisheries Management Agent, Bureau of Commercial Fisheries, Juneau, Alaska.

apparatus of German manufacture is capable of locating fish schools at angles ranging between 150° to port and 150° to starboard from the ship's forward direction at a distance of 6,500 feet. A thermometer which can measure water temperatures down to 120 meters (394 feet) is also used to locate fish concentrations.

Fig. 4 - Trawler of Okean class. Has refrigerated holds. Vessel uses conventional side trawl, and is also equipped for gill-netting.

Trawling is done only over the starboard side with 2 power-driven drums each capable of hauling 1,200 meters (3,937 feet) of warp at an average speed of 60 meters (197 feet) per minute. The length of the warps indicates that the maximum depth at which an SRT-R can fish is about 1,500 feet.

Gill-net fishing is highly mechanized, the net being hauled by a powered pulley in the starboard bulwark; 2 grippers pass the net over a shaking device. A fish-salting and packing machine, capable of processing 4.5 metric tons of fish an hour, is installed on the main deck to reduce manual labor. Average yearly Soviet catches for Okean-class trawlers amounted to 690 metric tons in 1959 and 710 tons in 1960. In the Far East, however, average catches were larger; the best vessels caught up to 1,100 tons in 1962 and over 2,000 tons in 1963.

STERN TRAWLERS: One of the most significant classes added to the Far Eastern fleet during 1960-63 has been the stern trawler, also known as the BMRT (Bolshoi Morozilnii Rybolovnii Trauler or Large Freezer Fishing Trawler). Four classes of stern trawlers are operated by the Soviets--Pushkin, Maiakovskii, Leskov, and Tropik. All except the Leskov class have been used in the Soviet Pacific fisheries. The Maiakovskiis predominate (21 were added to the Far East fleet during 1960-63); only one Pushkin was delivered before 1960, and one Tropik in 1963. The stern trawler may well become the predominant type among Soviet fishing vessels, because it is a completely autonomous unit capable of fishing at great distances from home port and processing its catch.

The U.S.S.R. embarked on mass production of stern trawlers in 1958, after their prototype, the Pushkin (constructed in West Germany from the design of the British-built Fairtry), proved successful under high-seas conditions. BMRT's are more productive than conventional trawlers, and can produce catches of as much as 20 to 25 metric tons a haul (Gorinov 1962). The average yearly catch per fisherman on a BMRT has been reported as being 51.6 tons, on a medium side trawler 30.4 tons. Small Soviet coastal trawlers produced only 16.7 tons per fisherman. The cost of catching a ton of fish on a BMRT comes to 120.5 rubles (US$135.5), much less than on smaller Soviet fishing vessels (Melnikov 1962).

The characteristics of the BMRT stern trawlers added to the Far East fishing fleet during 1960-63 are:

1. Maiakovskii class--Improved versions of the Pushkin, Maiakovskiis (fig. 5) have a cruising range of 16,000 to 17,000 miles and can stay at sea 80 days, of which 60 can be spent on the fishing grounds. The vessels are 3,170 gross tons in size, 278 feet in overall length, and operate with a crew of 102. Maiakovskiis are being constructed in U.S.S.R. shipyards at Nikolaev (on the Black Sea) at the rate of about 12 to 24 a year.

Fig. 5 - Stern trawler of the Maiakovskii class. Known also as a BMRT, the vessel is a completely integrated fishing and processing factoryship with freezing, canning, and reduction equipment.

Fishing equipment consists of a trawl and an electrically-driven winch for pulling

in the trawl and bringing it up the stern ramp. The fish brought aboard can be frozen, canned, or reduced to meal and oil. Two automated lines are able to fillet 20 tons of fish a day; another line beheads (by machine) and guts (by hand) 10 tons of fish a day. Two twin-chute freezing chambers use an air system capable of delivering a temperature of -35° C. (-31° F.). The fillets or dressed fish can be quick-frozen to a temperature of -18° C. (-0.4° F.) in about 3 to 4 hours. After glazing and packing, they are stored at -18° C. (-0.4° F.) in refrigerated holds with a volume of 1,330 cubic meters (46,969 cubic feet). The canning plant--two autoclaves and one sealing machine--has a daily production capacity of 3,500 cans. Oil is removed from cod livers in a rendering shop equipped with two boilers. The fish-meal plant has two single-drum units which can process 20 tons of fish or offal per day; the fish-meal hold has a capacity of 170 cubic meters (6,000 cubic feet).

2. Tropik class--The newest type of stern trawler in the Pacific fleet has been designed primarily for diversified fishing in the tropics, although it can operate in temperate and subarctic waters. Basically a trawler, vessels of the Tropik class are also equipped with (1) three line haulers for tuna long-line fishing3/; (2) folding platforms along the sides of the vessel for tuna pole-and-line fishing; (3) two motor dories (each 30 feet in length) for purse-seining or line fishing; and (4) a fish-pumping plant for bringing aboard fish attracted to the vessel by electric lights. The vessel is equipped for experimental drift-net fishing. Tropiks can process catches by freezing, and can produce fish meal and fish oil from waste and offal and surplus fish.

Tropiks now have a crew of about 75; but by the time the last vessel in this class comes off the assembly line in 1965, further automation of equipment may reduce the crew to about 50 persons. The vessels are about 2,600 gross tons in size, 262 feet in overall length, and can stay at sea 60 days. Working and living quarters are air-conditioned. The refrigeration plant, consisting of 6 ammonia compressors, provides for (1) the freezing of 30 metric tons of fish in 22 hours; (2) cooling the holds to -25° C. (-13° F.); (3) producing 6 tons of flake ice in 15 hours; and (4) chilling 25 tons of fish a day from 30° C. (86° F.) to 2° C. (35.6° F.). Fish are dressed by hand and, after freezing, are packed in cartons stored in 3 refrigerated holds with a volume of 940 cubic meters (33,196 cubic feet). Processing equipment can handle 50 tons of raw fish a day--30 tons for freezing and 20 tons for reduction to meal and oil. Up to 3 tons of cod livers can be reduced to medicinal oil.

The Soviets have plans to assign 30 Tropiks to their Pacific fishing fleet. So far, only one, the Pegas, was delivered in July 1963 to the Sakhalin-based fishing fleet; during January and February 1964 it conducted exploratory operations for mackerel and jacks in the warm waters of the East China Sea. It also has fished for tuna in the South China Sea, in waters near the Indonesian coasts, and in the Gulf of Siam.

HERRING MOTHERSHIPS (Severodvinsk class): A herring mothership fleet consists of a large base ship (fig. 6) and a fleet of drifters or trawlers. Only trawlers have been reported operating in the Bering Sea. No processing is done on the mothership; the vessel is designed solely to receive and store the herring catches of fishing vessels. Immediately after being caught, the herring are salted lightly and placed in barrels before transfer to the mothership. The mothership provides the fleet with fuel, water, provisions, salt, barrels, and social and medical services.

Fig. 6 - Herring mothership of the Severodvinsk class. Alongside is a stern trawler of the Maiakovskii class.

The Soviet Union placed an order for 11 Severodvinsk-class motherships in 1959 with the state-owned shipyard at Gdansk, Poland. All were delivered by 1963, and 5 were allotted to the Far East during 1960-62, principally for operations in the Bering Sea. Each vessel is about 10,000 gross tons in size, and has a crew of 257. It has 5 refrigerated holds of

3/The use of three line haulers is not explained in the original Soviet source (Rybnoe Khoziaistvo, vol. 38, no. 8, August 1962, p. 37).

10,150 cubic meters (358,444 cubic feet), sufficient to store about 5,000 metric tons of fish. About 200 tons of lightly salted herring can be chilled each day and maintained at 0° C. (32° F.), assuring the good quality of this highly perishable fish. A helicopter, which can take off from a landing platform situated at the stern of the ship, aids in tracking schools of fish. The vessel's hull is strengthened for navigation in ice, a feature that also enables the mothership to withstand the striking of drifters or trawlers against the hull during loading or unloading operations. Eight fishing vessels, four on each side, can moor simultaneously alongside the 500-foot-long mothership.

FACTORYSHIPS (Zakharov class): The factoryship is designed to process fish and shellfish into finished products, as well as perform the service functions of a mothership. Although a variety of factoryships are operated by the Soviets in the Pacific, floating canneries were the only type of factoryship added to the Far East fleet during 1960-63. The Zakharov-class floating cannery (fig. 7) receives fish and shellfish from its fleet of SRT's (medium fishing trawlers) or from the 12 motorboats that it carries. The motorboats are of the Japanese *kawasaki* type, specially designed for catching king crabs with tangle nets, but they can be used for other types of fishing. Though designated a cannery, the Zakharov is also equipped to manufacture fish meal and oil from wastes obtained during canning operations.

Fig. 7 - Factoryship of the Zakharov class. Alongside is an SRT trawler. The factoryship carries 12 motorboats for king crab fishing; two can be seen near the bow and stern.

Zakharov-class factoryships have been built at the Admiralty Shipyards in Leningrad since 1959. During 1960-63, 5 were delivered to the Far East, and it is reported that 3 more will be delivered in 1964. The vessels are 12,675 gross tons in size, 532 feet in overall length, and have a cruising range of 11,000 miles. Of the 640 people aboard, about 500 are processing workers and the rest are crew members. Processing equipment is capable of canning various species (e.g. herring, sardines, saury, ocean perch, and king crab), thereby enabling the factoryship to be used throughout the year. Automatic and semiautomatic machinery are consolidated into mechanized production lines. Daily capacity of the canning lines is about 1,600 cases, produced in three 7-hour shifts. About 2.4 tons of fish meal can be produced each day. Facilities are available for preparing caviar from salmon roe. The refrigeration plant is designed to (1) produce 25 tons of chipped ice each day, (2) cool fish in brine tanks, and (3) cool fish-storage and provision holds that have a total volume of 1,520 cubic meters (53,678 feet).

Considerable improvements have been carried out on recently constructed Zakharov-class factoryships. Reportedly, storage and ice production capacity have been doubled, and additional automation of production lines has made possible a reduction of 115 workers. The introduction of air-conditioning in the living quarters presages eventual deployment of those vessels in tropical fishing regions.

Soviet floating canneries are capable of remaining at sea independently for three months, but have been reported on Bering Sea grounds for as long as a year. In such instances, support vessels bring in supplies and transship finished products to Soviet ports. The Zakharovs have been observed during 1959-63 in Bristol Bay operating for king crab, and for a short time in 1963 in the western part of the Gulf of Alaska. The factoryships have also serviced vessels fishing for herring and ocean perch in Bristol Bay and saury off the Kuril Islands in the western Pacific.

REFRIGERATOR VESSELS: About 10 classes of refrigerator transport vessels have been used by the Soviet Far East fleet. The older classes act principally as refrigerator fish carriers (Refrizherator Rybnyi) and do not have equipment for quick-freezing fish. Construction of those classes has been discontinued. The newer classes, which are called production refrigerator transports (Proizvodstvennii Refrizherator), are designed to take fish on board at the place of capture, freeze them, and then deliver the frozen products to home ports.

The movements of the refrigerated and cargo fish carriers are controlled by the Administration of the Far East Refrigerator Fleet (Dal'Vostokrybkholodflot), headquartered at Vladivostok as part of the Main Administration of Far East Fisheries. The refrigerator transports are assigned to 11 operational units, each serving a Far East fishing fleet. In addition, an unknown number of cargo vessels transport salted herring in barrels.

At least 20 large refrigerator vessels were added to the Administration of the Far East Refrigerator Fleet during 1960-63. By 1963, a total of more than 70 refrigerator fish carriers were plying North Pacific waters, transporting processed, semiprocessed, and frozen fishery products from the fishing grounds to the mainland, thereby enabling fishing vessels to remain on the fishing grounds for long periods of time. The new additions to the Far East Refrigerator Fleet during 1960-63 were of the following five advanced classes:

1. Bratsk class--Eight refrigerator vessels of the Bratsk class were allotted to the Soviet Far East fleet during 1961-63. Those vessels--built in East Germany's Stralsund Volkswerft (Stralsund People's Shipyard)--are 270 feet in overall length, have a gross tonnage of about 2,500, carry a crew of 91, and can cruise for 40 days without replenishing supplies and fuel. The freezing and refrigeration plant consists of 2 freezer machines, 4 air-blast freezing tunnels, packing departments, refrigerating machines, and refrigerated holds. About 50 tons of fish--taken aboard fresh or iced from the catcher boats--can be frozen in a 22-hour period. Hold capacity of 1,800 cubic meters (63,566 cubic feet) permits storage of about 800 tons of frozen fish in cartons. Temperature in the holds is maintained at about -18° C. (-0.4° F.).

2. Tavriia class--Constructed in the Soviet Union, vessels of the Tavriia class (fig. 8) perform the same functions as those of the Bratsk class, taking aboard whole or gutted fish, quick-freezing them, and then conveying them to distribution centers on the Soviet mainland. Tavriias are 325 feet in overall length and 3,230 gross tons in size. Fish are frozen without further processing in two tunnel-type air-blast installations with a capacity of 50 metric tons per day. The fish are then placed in holds with a capacity of 3,300 cubic meters (116,539 cubic feet) at a temperature of -18° C. (-0.4° F.). In one hold the temperature can be lowered to -25° C. (-13° F). If the quantity of fish taken aboard exceeds the daily freezing capacity, 20 tons of fish can be preserved in flake ice and stored in coolers at 0° C. (32° F.). About 12 tons of flake ice can be produced each day.

Fig. 8 - Refrigerator transport of the Tavriia class. On board are facilities for quick-freezing and storing fish brought to the vessel by a fleet of fishing craft.

3. Pervomaisk class--Built for the Soviet ship-importing state enterprise (Sudoimport) by a Danish shipyard, Pervomaisk-class refrigerator vessels are 328 feet in overall length and about 3,300 gross tons in size. Air-blast freezer tunnels are fully automated. Further information on this class of refrigerator vessel is not available.

4. Sevastopol class--The largest refrigerator transports in the Soviet Far East fishing fleet are vessels of the Sevastopol class. Those vessels--430 feet in overall length and 5,525 gross tons in size--have been built at the Baltic Shipyard in Leningrad since 1961. Three were allocated to the Far East in 1962 and 1963. Sevastopols can freeze whale meat transferred from a whale factoryship, freeze fish without dressing them, and transport the frozen products to the Soviet Union.

The Sevastopol's freezing facilities, with a daily capacity of 100 metric tons of fish, consist of 8 air-blast freezing tunnels, each 39 feet long. Trays, each holding 33 to 40 pounds of fish, are loaded onto carts that are conveyed automatically through the freezer tunnels; the fish can be quick-frozen in $4\frac{1}{2}$ hours. The frozen fish are removed automatically and stored

at a temperature of -18° C. (-0.4° F.) in five holds of 5,400 cubic meters (190,700 cubic feet) and a total capacity of 2,700 metric tons of fish.

5. Skryplev class--Although designated a refrigerator transport, Skryplevs (fig. 9) are virtually a factoryship that can freeze fish and prepare fish meal and oil. A distinctive feature of this transport is a stern ramp fitted with a gate which can be closed. Fish can be taken over the side direct from a fishing vessel or the vessel can leave its trawl bag floating on the surface of the sea. The bags are marked by buoys, usually fitted with radar reflectors; the transport's radar is used to locate the bags and they are brought aboard up the stern ramp. Three vessels of this class (built in Denmark) were allocated to the Far East fleet in 1962 and 1963.

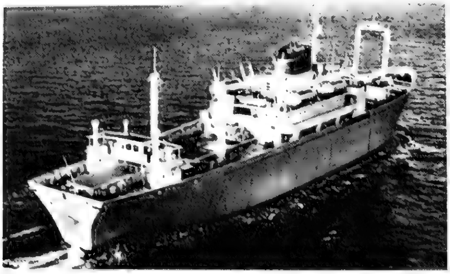


Fig. 9 - Refrigerator transport of the Skryplev class. Besides freezing fish, meal and oil can also be prepared. The stern ramp is used to bring aboard trawl bags brought to the transport by fishing craft.

Skryplevs are 300 feet long between perpendiculars, 4,700 gross tons in size, and carry (excluding the actual crew) 102 people for handling and processing catches. For short-time preservation of fish, two ice-making plants can produce 10 tons of flake ice per day from sea water. The transport is fully equipped with fish filleting and heading machines, and has fish meal and oil plants capable of handling 30 tons of waste, offal, and surplus fish per day. Cod livers can be processed into medicinal oil in a special liver oil plant.

WHALING VESSELS: Due to the special nature of whaling operations, the Main Administration of Far East Fisheries has established a special Administration of Whaling Fleets, which is in charge of Far East whaling ships operating in the North Pacific as well as the one in the Antarctic. This Administration organizes timetables for tankers delivering fuel and taking on whale oil, and keeps records on the production of the fleets. On the whaling grounds, however, operational command and coordination with catcher boats remains with the captains of the whaling factoryships.

Soviet Pacific whaling operations predate the foundation of the city of Vladivostok, but were conducted for many years on a small scale from shore stations. In the late 1920's, a United States cargo vessel was purchased and converted into a whaling factoryship. Renamed the Aleut, it began operations in the North Pacific during the 1932/33 whaling season. Aleut operations were limited to the western North Pacific until 1959, when it began to hunt whales along the western Aleutian Islands. In 1962, the Aleut operated briefly off Kodiak Island in the Gulf of Alaska, possibly on an exploratory mission. In 1962 and 1963, major additions were made to the Pacific whaling fleet; 3 factoryships and at least 27 catcher boats were allotted to the Far East. All Soviet Pacific whaling vessels are based at Vladivostok or Nakhodka. The factoryship additions were as follows:

1. Sovetskaia Rossiia--A sistership of its prototype, the Sovetskaia Ukraina (assigned to the Atlantic fleet), the Sovetskaia Rossiia was constructed at Nikolaev on the Black Sea and joined the Far East whaling fleet in 1962. The vessel is about 33,150 gross tons in size, 715 feet in overall length, furnishes logistic support to 20 catcher boats, and is reported to be the world's largest whale factoryship. The Sovetskaia Rossiia has participated in Antarctic whaling each year since the 1962/63 season.

Fig. 10 - Whale factoryship of the Vladivostok class. The vessel is equipped for either whaling or fish processing.

2. Vladivostok class--In 1963, two newly constructed whale factoryships--the Vladivostok and the Dalnii Vostok--were assigned to the Far East fishing fleet. Constructed in West Germany, those vessels, each 596 feet in overall length and 17,150 gross tons in size, are equipped for either whaling or fish processing. The vessels (fig. 10) have a permanently installed whale factory, meal processing plant, and refrigerator tunnel. About 1,700 tons of raw whales can be handled daily by the whale factory to produce about 220 tons of oil, 200 tons of meal, 6.5 tons of vitamin oil, and 45 tons of frozen meat. When not whaling, a removable fish-processing plant is placed on the flensing deck; a daily quantity of 500 tons of raw fish can be processed into about 25 to 45 tons of fillets, 50 tons of frozen fish, 100 tons of fish meal, and 35 tons of fish body oil.

SUMMARY

The Soviet Far East Region, a geographical and economic rather than a political unit, includes all lands between Siberia and the Pacific. This Region extends over 3.6 million square miles or an area as large as the entire United States. Only about 5 million people, however, inhabit this huge land, which borders on Communist China to the South and on the Arctic Ocean and the Bering Sea to the North. The Soviet Government, anxious for the rapid economic and demographic development of such a strategically-exposed territory, is devoting large sums of capital to the build-up of the Far East economy.

Fisheries are the most important economic activity in the Soviet Far East, situated as it is on the vast and rich seas of the northwestern Pacific. The annual output of the Region's fishing industry, valued at nearly US$1.1 billion, represents about one-third of the value of the total industrial production of the Region. In 1963, the Far East produced over 1.5 million metric tons of fishery landings, or about one-third of the total Soviet landings of 4.7 million tons. In 1950, Soviet Far East landings had amounted to only 370,000 metric tons, which constituted a little over one-fifth of the total U.S.S.R. fishery landings that year.

This large expansion in production reflects the high priority which the central government in Moscow attaches to the rapid growth of the Far East fishing industry. Since 1946, well over one billion rubles (US$1.1 billion) have been allocated to the Far East provinces for the expansion of their fishing industry. Annual investments have increased steeply during the current 7-Year Plan (1959-1965) and represent approximately 1 percent of all Soviet industrial investments. The principal beneficiary of the current outlays is the Maritime Province (Primorskii Krai), whose yearly allocations increased eightfold in a decade. Most of the capital investments--currently up to about 75 percent--are spent on vessels. As a result, an unprecedented growth of the Soviet Pacific fishing fleet is taking place. During 1960-63, the Soviet Government added to this fleet over 200 modern fishing, fish-processing, whaling, and support vessels for an estimated gross tonnage of 500,000 tons. About one-half of that tonnage was constructed in domestic shipyards; the other half was purchased from Poland, West and East Germany, Denmark, Finland, and other countries. The trend in Soviet Far East fisheries has been toward building more processing and supporting vessels, vital for operating fishing vessels over long periods far from home ports or shore bases.

LITERATURE SOURCES

BORGSTROM, GEORG
1961. The Atlantic Fisheries of the U.S.S.R. Atlantic Ocean Fisheries, pp. 282-315. Fishing News (Books) Ltd., London.

CHERNYSHEV, V.
1963. V Centre Vnimaniia--Rybnoe Khoziaistvo (Fishing Industry Should Become the Center of Attention). Partiinaia Zhizn, no. 15, August 1963, pp. 15-20 (in Russian).

GARFIELD, MORTON J.
1959. High-Seas Fisheries of the U.S.S.R. U.S. Bureau of Commercial Fisheries, Fishery Leaflet no. 482.

GORINOV, A.
1962. Fishing Craft of the U.S.S.R. Fishing News International, vol. 1, no. 5 (October 1962), pp. 80-82.

MARGOLIN, ADOLF B.
1963. Problemy Narodnogo Khoziaistva Dal'nego Vostoka (Problems of Development in the Economy of the Far East). Akademiia Nauk SSSR, Moskva (in Russian).

MELNIKOV, G. B. and N. E. SAL'NIKOV
1962. Razvitie Rybnoi Promyshlennosti, Rybnogo Khoziaistva i Zadachi Biologicheskoi Nauki v Svete Reshenii XXII S'ezda KPSS (Development of the Fishing Industry and Fishery Management in the Light of the Resolution of

LITERATURE SOURCES (Contd.)

the 22nd Congress of the Soviet Communist Party). Zoologicheskii Zhurnal, vol. 41, no. 2, pp. 1,771-82 (in Russian).

MIKHAILOV, S. V.
1962. Ekonomika Rybnoi Promyshlennosti SSSR (The Economics of the Soviet Fishing Industry). Pishchepromizdat, Moskva (in Russian).

NAGIBAIDZE, SH. G.
1961. Razvivat' Rybnuiu Promyshlennost' Sakhalina i Kuril'skikh Ostrovov (The Development of the Sakhalin and Kuril Islands Fishing Industry). Rybnoe Khoziaistvo vol. 37, no. 12, (December 1961), pp. 6-11, Moskva (in Russian).

SLAVIN, S. V.
1961. Promyshlennoe i Transportnoe Osvoenie Severa SSSR (Industrial and Transportation Conquest of the Soviet North). Izdatel'stvo Ekonlit, Moskva (in Russian).

TSENTRAL'NOE STATISTICHESKOE UPRAVLENIE PRI SOVETE MINISTROV SSSR (Central Statistical Administration of the USSR Council of Ministers).
1963. Narodnoe Khoziaistvo v Godu 1962 (The National Economy in 1962). Gosstatizdat', Moskva (in Russian).

1964. SSR v Tsifrakh (U.S.S.R. in Numbers). Gosstatizdat', Moskva (in Russian).

U. S. CONGRESS. SENATE. COMMITTEE ON COMMERCE.
1964. The Postwar Expansion of Russia's Fishing Industry (by Leon M. Herman). U. S. Government Printing Office. (88th Congress, 2nd Session, Senate).

VEREVKIN, A.
1963. Izpol'zovat' Bogatstva Dal'nego Vostoka (Let Us Utilize the Natural Resources of the Far East). Planovoe Khoziaistvo, no. 9, September 1963, pp. 72-75 (in Russian).

Note: The author wishes to express his appreciation to Dr. Sidney Shapiro, U. S. Bureau of Commercial Fisheries, for his guidance and valuable comments on the substance of this article, as well as for expert editorial assistance.

Editorial Assistants: Ruth V. Keefe and Jean Zalevsky

Compositor: Alma Greene

* * * * *

Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Cover--Burmeister and Wain, Copenhagen, Denmark; p. 7--Karl W. Kenyon; p. 8--Robert K. Brigham; pp. 9, 10, and 12 (fig. 10)--U. S. Coast Guard; p. 11--The Boston Globe; p. 12 (fig. 9)--A. W. Anderson, U. S. Regional Fishery Attache for Europe; p. 20--George French, Maine Development Commission; p. 23--Dept. of Sea and Shore Fisheries, State House, Augusta, Me.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402, Price 60 cents (single copy). Subscription Price: $6.50 a year; $2 additional for foreign mailing.

OVERALL VIEW OF SOVIET FISHERIES IN 1963, WITH EMPHASIS ON ACTIVITIES OFF UNITED STATES COASTS

By Loyal G. Bouchard*

ABSTRACT

The U.S.S.R. fishery catch has increased steadily in recent years, the result mainly of the expansion and integration of high-seas fishing fleets. The significant development is that Soviet fleets and vessels have developed the capability of fishing great distances from home ports. Those vessels now fish commercial fishery concentrations off the Atlantic and Pacific coasts of the United States. It is highly probable that Soviet fishing effort will increase in the Western Hemisphere, particularly in the western Atlantic, where the Soviets have made arrangements for the expansion, modernization, and use of a Cuban fishing port in Havana Bay.

INTRODUCTION

The fishery catch of the U.S.S.R. has more than doubled since 1950. Within the last decade, the Soviet Union has moved ahead of the United States to occupy fourth place among the leading fishing nations of the world. The large increase in the Soviet catch, which was already at a high level, is the result of expanded high-seas fishing operations. Fully integrated Soviet fishing fleets and large stern factory trawlers are now capable of fishing for prolonged periods at great distances from home ports. Such capability has enabled the Soviets to fish for commercial quantities of fish at the opposite sides of the Atlantic and Pacific Oceans. Soviet fishing fleets are now a common sight off the coasts of Alaska and New England, and Soviet fishing vessels also frequent the Gulf of Mexico, the Caribbean Sea, and areas off the Middle and South Atlantic coast of the United States.

CATCH AND PRINCIPAL SPECIES

Soviet Landings, excluding whales and other marine mammals, for selected years (preliminary estimate for 1963) reflect the remarkable progress and expansion of the Soviet fisheries.

Table 1 - U.S.S.R. Fishery Landings, 1950, 1955, 1960-63[1/]

Year	Catch
	Metric Tons
1963	4,200,000
1962	3,616,500
1961	3,250,000
1960	3,051,000
1955	2,495,000
1950	1,627,000

1/Source: FAO Yearbook of Fishery Statistics, 1962.

Herring in 1962 comprised 24.5 percent of the Soviet catch, compared with 17.9 percent in 1955 (table 2). Cod and related species (including Alaska pollock) are also of major importance, and represented 24.4 percent of the Soviet catch in 1962. Catches of sprat, flatfish, and ocean perch have also increased significantly since 1955, whereas the catch of king crab has shown slight gains, and catches of Pacific salmon and fresh-water species

Table 2 - U.S.S.R. Catch of Fish and Shellfish, by Selected Species, 1955, and 1960-62

Species	1962	1961	1960	1955
	(1,000 Metric Tons)			
Marine:				
Cod, hake, haddock, and related species	783.8	669.7	563.3	686.0
Alaska pollock	97.2	97.6	109.2	9.7
Herring:				
Atlantic	500.7	396.7	523.4	224.4
Baltic	65.8	63.8	60.0	85.6
Pacific	320.5	272.8	193.0	135.9
Total herring	887.0	733.3	776.4	445.9
Sprat	270.0	234.0	199.8	177.2
Flounder, sole, halibut, and related species	238.7	273.1	241.7	127.2
Ocean perch	111.5	123.7	183.9	31.6
Salmon, Pacific	64.2	84.8	73.8	172.4
King crab	41.4	38.7	36.7	37.4
Other marine	758.7	574.8	434.6	237.6
Total marine	3,252.5	2,829.7	2,619.4	1,925.0
Fresh water[1/]	364.0	420.3	431.6	570.0
Grand total	3,616.5	3,250.0	3,051.0	2,495.0

1/Principally roach, bream, carp, pike, pike-perch, and whitefish.
Source: FAO Yearbook of Fisheries Statistics, 1960 and 1962.

*Assistant Chief, Branch of Foreign Fisheries, U. S. Bureau of Commercial Fisheries, Washington, D. C.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 715

have declined. From 1961 to 1962, catch gains were noted for cod and related species, herring, sprat, and king crab, with declines in flatfish, ocean perch, and Pacific salmon. The Soviet catch of tuna reached 1,000 metric tons in 1962.

FISHING AREAS

A broad breakdown of the Soviet catch by area was based on an association between known species of fish and known bodies of water (table 3).

Table 3 - U.S.S.R. Fishery Catch by Area of Capture 1/, 1956 and 1962

Fishing Area	Catch 1962	Catch 1956
	. . . (Metric Tons) . . .	
Marine:		
Atlantic Ocean, Barents Sea, White Sea and adjacent waters	1,259,500	912,400
Pacific Ocean, Bering Sea, Sea of Okhotsk and adjacent waters	777,800	551,300
Baltic Sea, Sea of Azov, Black Sea, and Caspian Sea	356,100	394,600
Unidentified	859,100	268,700
Total marine	3,252,500	2,127,000
Fresh water	364,000	489,000
Grand total	3,616,500	2,616,000

1/Source: FAO Yearbook of Fishery Statistics, 1956 and 1962.

The Atlantic Ocean and adjacent waters supply over one-third of the total Soviet catch and continue to be of increasing importance. Large and increasing Soviet catches are also being taken in the Pacific Ocean and adjacent waters, particularly in the North Pacific and Bering Sea. The catch by major fishing area for 1956 and 1962 offers at best only a somewhat relative comparison; the data suggest that the catch from waters of the Atlantic Ocean area probably has increased by at least 38 percent since 1956, compared to a minimum catch increase from waters of the Pacific Ocean area of 41 percent. The catch in the "unidentified" category could not be further separated into the major marine fishing areas listed from the information presently available.

In the northwestern Atlantic Ocean, the Soviets are known to be taking significant quantities of ocean perch, cod, whiting (silver hake), haddock, herring, flounder, and halibut. Soviet catches, by principal species, taken in the ICNAF (International Commission for the Northwest Atlantic Fisheries) Convention area for the years 1956 and 1962-63 are given in table 4. In 1963, for the first time, whiting (silver hake) dominated the Soviet catch in the ICNAF Convention area, followed by herring, cod, and ocean perch. The herring and cod catches declined from 1962 to 1963. Soviet fleets now frequent the Grand Banks off Newfoundland and Georges Bank off New England. In August 1963, a peak number of over 200 Soviet vessels was reported operating on Georges Bank. In June 1963, a group of seven stern trawlers (BMRT class) was observed fishing for whiting (silver hake) in the vicinity of Bloc Canyon 1/, 30 miles south of Block Island, Rhode Island. The Soviet Union is also making a major effort to develop new fishing grounds in Davis Strait west of Greenland, and off the Labrador coast.

Table 4 - U.S.S.R. Catch in the ICNAF Convention Area, 1956, and 1962-63

Species	1963	1962	1956
	. . . . . . (Metric Tons)		
Cod	81,658	100,791	3,001
Herring	100,036	160,404	1/
Whiting (silver hake) .	230,380	50,725	1/
Ocean perch	37,535	32,269	12,908
Haddock	6,504	5,315	1/
Other	35,333	20,290	1,100
Total	491,446	369,794	17,009

1/Included with "other."
Source: Documents of the International Commission for the Northwest Atlantic Fisheries (ICNAF).

In 1963, about 40 Soviet vessels, mostly medium trawlers and some stern trawlers, operated off the United States Atlantic coast from Nantucket Island south to Florida. In early 1964, about 30 Soviet medium trawlers were reported to be operating out of Cuban ports. In the past two years, some of those craft were observed off Virginia, the Carolinas, Florida, and Louisiana; it is believed those craft are conducting exploratory fishing operations and perhaps oceanographic studies off the Middle and South Atlantic coast of the United States, and in the Gulf of Mexico and Caribbean Sea. Species sought may include menhaden, shrimp, and tuna, among others. Soviet stern trawlers, operating off the coast of Virginia in March 1964, were taking scup, sea bass, and sea robins. In June 1962, a Soviet exploratory fishing vessel was reportedly seeking menhaden off the coasts of North and South Carolina. Soviet

1/A canyon in the ocean floor at approximately 39°42' N. latitude and 71°15' W. longitude.

scientists are known to be making a detailed study of the menhaden resources of the northwestern Atlantic; the study includes a thorough review of reports published on the subject in the United States. Soviet research vessels are also assisting the Cubans in an oceanographic study of the Gulf of Mexico.

In August 1962, it was announced that a Cuban fishing base, financed jointly by the Soviet Union and Cuba, would be built in Havana Bay. Reports indicate that construction at the base is proceeding rapidly and will include a shipyard for repairs, a large cold-storage plant, canneries, warehouses, and a fish reduction plant. The base will also be equipped with extensive docking facilities and will service about 130 Soviet fishing vessels as well as serving Cuban needs. The cold-storage plant will have a 10,000-ton capacity. In September 1963, about 2,000 workers were employed in construction at the base.

Some offshore marine resources of the western Atlantic, particularly off the coasts of Central American, South American, and Caribbean countries, are generally considered to be underdeveloped. Several Latin American countries do not have extensive fishery development capability and are not likely to develop such capability in the near future. In addition, the fisheries of the United States, Canada, and Mexico are highly selective, and certain species off the coasts of those countries are underutilized. Because of Soviet access to a Cuban fishing base and ports, Cuba's ideal location, Soviet fishing capability, and the underutilized state of many of the offshore marine fishery resources, the Soviets are expected to increase fishing efforts in the western Atlantic and adjacent waters in the future and further assist and encourage the Cubans in fishery development. In addition to the species mentioned previously, the Soviets may exploit stocks of flyingfish, anchovies, mackerel, swordfish, croaker, snapper, and other bottomfish and pelagic species available in sufficient quantity.

At least 400 Soviet vessels, at one time or another, fished on the high seas in the North Pacific and Bering Sea in 1963. Soviet catches in the North Pacific and Bering Sea include herring, ocean perch, flounders and soles, cod, Alaska pollock, sablefish, king crab, shrimp, and halibut. The halibut catches in the northeastern Pacific and eastern Bering Sea areas are believed small and incidental to trawl efforts for other bottomfish species. In October 1963, a Soviet research vessel reported taking good catches of halibut and sablefish in deep waters in the central Bering Sea area, but the exact location is not known. The Soviets are not known to be using baited multiple-hook and line sets for intensive commercial halibut fishing off Alaskan coasts as yet. Tangle nets are being used for king crab and in 1963, for the first time, the Soviets sought this species in the Gulf of Alaska, about 30 miles southwest of Kodiak Island. The Soviets first began trawling for ocean perch in the Gulf of Alaska in 1962. Meanwhile, Soviet exploratory fishing vessels were seen as far south, in the eastern North Pacific, as off the coasts of Washington, Oregon, and California. No data are yet available on the quantity of Soviet catch taken in the Gulf of Alaska. Catches of selected species in the Bering Sea are shown in table 5.

Table 5 - U.S.S.R. Catches of Selected Species in Bering Sea, 1960-1961[1/]

Species	Catch	
	1961	1960
	. . . . . (Metric Tons)	
Flatfishes	173,100	105,680
Herring	68,700	0
Ocean perch	48,500	11,700
Saury	24,440 (est.)	13,000
Other	14,700 (est.)	7,820
Total	329,440 (est.)	138,200

1/Source: Rybnoe Khoziaistvo, No. 10, October 1961.

The Soviets are also actively conducting fishing operations off the west coast of Africa and in the Indian Ocean. Soviet fishing craft have called at West African ports in Angola for supplies and fuel and the Soviets are assisting commercial fisheries development in Ghana. In mid-April 1963, the Fifth Soviet Tuna Research Expedition returned to Vladivostok from four months of exploration off the Chagos Archipelago in the western Indian Ocean. It is expected that commercial fishing operations will begin in that area in the near future for tuna, mackerel, and swordfish.

FLEETS AND VESSELS

The increased catch made by the Soviet Union is, for the most part, the result of high-seas fleet expansion with emphasis on increasing the number of larger motorized craft. In

1956, the Soviet fishing fleet numbered 60,443 craft, of which 12,387 were motorized and 48,056 were nonmotorized. In 1964, although precise figures are not available, the number of motorized Soviet fishing craft has increased significantly and could be as much as double the 1956 figure. The versatility and range of Soviet fishing fleets and vessels were also increased significantly.

The first Soviet stern trawlers were ordered in the mid-1950's and became operational a year or two later. Today, the Soviets have about 100 of those 2,600- to 3,200-gross-ton fishing vessels. The Soviets have also increased the number of medium fishing trawlers and seiners (250 to 600 gross tons each), as well as motherships, factoryships, and other fleet-supporting craft, but the total number is unknown. One Soviet herring fleet, operating off the Norwegian coast in April 1961, numbered more than 1,000 vessels. As mentioned previously, other Soviet fleets of 200 or more fishing vessels now frequent New England and Alaskan coasts.

The ocean-going fleets of the U.S.S.R. are highly versatile, mechanized, and integrated. Equipped with the most modern electronic fish-locating techniques and using a wide assortment of fishing gear, those fleets are capable of taking and processing commercial quantities of numerous pelagic and demersal species of fish in distant waters. Large floating factoryships and motherships produce canned, salted, and frozen fish and shellfish, and fish meal and oil, and are capable of remaining at sea for 60 days or more. Some are known to have remained at sea for as long as a year. Refrigerated carriers, cargo vessels, and transport ships haul to Soviet ports the catches processed by the factoryships and taken by the seine and trawl craft, and return with food, supplies, equipment, spare parts, mail, personal items, and replacement workers. Tugboats rescue disabled craft and repairs are often made on the high seas. Vessels comprising the large Soviet fleets are constructed in shipyards in the Soviet Union (in Western Europe and the Far East), East Germany, West Germany, Poland, Denmark, Sweden, Finland, and Japan.

FISH FARM ON LAKE HANKA, SOVIET FAR EAST

An expedition from the Pacific Institute of Fisheries and Oceanography has concluded several years of work on Lake Hanka, in the Soviet Far East.

The expedition studied the lake's flora and fauna, as well as hydrological conditions. The purpose of this research, the first of its kind there, was to study the conditions for artifical propagation and acclimatization of valuable varieties of fish.

Lake Hanka is one of the most interesting lakes in the world. It has about 60 varieties of fish, including fresh-water fish from cold northern latitudes as well as from the tropics, representatives of Asian fauna, and sturgeons from Russian European rivers.

A farm for the cultivation of the mirror carp will be built on the lake. It will be one of the biggest of its kind in the Soviet Union. (The Fishing News, June 26, 1964.)

SUPPLY, SUSTAINED YIELD, AND MANAGEMENT OF THE MAINE LOBSTER RESOURCE

By Robert L. Dow*

INTRODUCTION

Biological, environmental, and economic data have been assembled for presentation in the sequence of their relevancy to an understanding of the Maine lobster fishery and the resource which supports that fishery.

Specifically the data consist of landings statistics (tables 1, 2, 3, 11), annual average number of traps fished as an indicator of effort (tables 2, 11), average landed value (tables 3, 10), estimates of fishing and natural mortality rates from stratified sampling of catch (tables 4, 5), length-frequency measurements for estimates of recruitment rate (table 6), estimates of total available legal supply (table 7), and sea water temperatures recorded at Boothbay Harbor by the U. S. Fish and Wildlife Service (tables 8, 9, 11). Data are presented in terms of their inter-relationships.

The purpose is to demonstrate the use of biological, economic, and environmental information to (1) forecast relative abundance and available supply (tables 9a, 10a), (2) monitor changes in the population (tables 9, 10), and (3) recommend a type of management which would permit sustained annual yield of the fishery at or near optimum levels (table 14, fig. 5).

DISTRIBUTION AND LIFE HISTORY

The American lobster, Homarus americanus, the largest and commercially most important crustacean in Maine waters, supports the seventh most valuable United States fishery and brings the highest unit price of any major species in North America. These economic facts have been important considerations in appraising the biological condition of the resource and in predicting available abundance, both present and future.

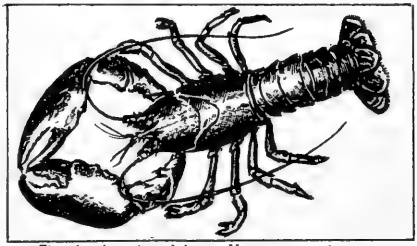


Fig. 1 - American lobster, Homarus americanus.

The lobster is especially abundant in Maine and Nova Scotia and occurs elsewhere in smaller numbers, both inshore and offshore, from Labrador to the Middle Atlantic.

At periodic intervals throughout life, varying with the rate of growth and commencing at the end of the first larval stage, the lobster moults. Although individual lobsters may moult at any season, for the majority this debilitating experience takes place sometime between May and September. In Maine there is a geographical variation; moulting occurs about six week earlier in western Maine waters than in the extreme eastern portions of the coast.

Shortly after moulting, while the new shell is soft, the mature female is impregnated by a hard-shelled male. Following approximately a year, the eggs are extruded from the ovaries and fertilized by the sperm which has been retained in the seminal receptacle. The fertilized eggs are attached in an adhesive mass to the swimmerettes under the tail. The number of eggs produced varies geometrically with the size of the female; the range reported from measurements at Boothbay Harbor (Taylor 1950) was from approximately 6,000 to 40,000 eggs for lobsters with a carapace from $3\frac{1}{4}$ to 5 inches. During the warm months of the following year the eggs complete incubation and hatch.

* Research Director, Maine Department of Sea and Shore Fisheries, Augusta, Me.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 716

The length of the larval period varies largely with sea water temperature from a minimum two weeks at 68°-70° F. to a theoretical maximum of approximately two months with low temperatures. Young lobsters become permanent bottom residents with the fifth larval stage.

Living on the ocean bottom, among and under the rocks and in burrows, and seeking shelter of rockweeds, kelps, and other marine algae, the lobster is a relatively sedentary animal, foraging at night but generally quiescent during daylight.

THE FISHERY

The record of 64 years of landings in table 1 shows the wide variation in production from 5 million to nearly 25 million pounds.

Table 1 - Maine Lobster Landings, Selected Years 1880-1963

Year	Millions of Pounds	Year	Millions of Pounds	Year	Millions of Pounds	Year	Millions of Pounds
1963	22.8	1947	18.3	1931	5.4	1906	15.0
1962	22.1	1946	18.8	1930	7.8	1905	11.1
1961	20.9	1945	19.1	1929	6.6	1904	12.1
1960	24.0	1944	14.1	1928	7.1	1903	13.1
1959	22.3	1943	11.5	1924	5.5	1902	14.3
1958	21.3	1942	8.4	1919	5.8	1901	14.0
1957	24.4	1941	8.9	1916	10.2	1900	14.4
1956	20.6	1940	7.6	1915	11.5	1899	12.7
1955	22.7	1939	6.6	1914	12.9	1898	12.3
1954	21.7	1938	7.7	1913	12.2	1897	11.2
1953	22.3	1937	7.3	1912	16.3	1892	17.6
1952	20.0	1936	5.1	1911	16.2	1890	20.0
1951	20.8	1935	7.7	1910	19.9	1889	24.5
1950	18.4	1934	5.4	1909	17.0	1888	21.7
1949	19.3	1933	5.9	1908	17.6	1887	22.9
1948	15.9	1932	6.1	1907	17.4	1880	14.2

The lobster fishery in Maine waters is carried on by means of pots or traps attached to buoyed lines--singly, in pairs, or on trawls. Pots or traps, similar to their probable progenitors (the creels fished in the waters of northwestern Europe and the British Isles), permit some selectivity, but in general, are inefficient. In terms of their return, the pots used require extensive capitalization. Traps or pots used alone represent about $10 million in time, labor, and investment. About the same amount is invested in boats, motors, and other equipment.

Fig. 2 - Lobster traps stacked up at Baily Island, Me.

The fishery in Maine waters began about 1843, primarily to supply canneries. There are reports of earlier use of the lobster resource for cod bait and for fertilizer.

Relatively few changes in the methods of fishing have been developed. Associated equipment such as depth recorders and improved boats and motors permit the individual fisherman to operate in a greater area and for a longer season, but in general the fishery has seen little change.

FLUCTUATIONS IN PRODUCTION

Studies have shown that major long-term fluctuations in Maine lobster landings can be attributed to variations in fishing effort (Dow 1961), of which the number of traps being fished is the most consistent index. This relationship is indicated by table 2.

Table 2 - Average Annual Fishing Effort (Units of Gear) and Total Annual Maine Lobster Landings for Selected Years

Year	Effort (Number of Traps)	Landings
	1,000	Millions of Lbs.
1924	154	5.5
1933	180	5.9
1937	186	7.3
1941	194	8.9
1897	234	11.2
1944	252	14.1
1902	298	14.3
1906	305	15.0
1950	430	18.4
1953	440	22.3
1955	532	22.7
1957	565	24.4

Table 3 - Average Annual Landed Value and Total Annual Maine Lobster Landings for Selected Years

Year	Landed Value	Total Landings for Years
	¢/Lb.	Millions of Lbs.
1934	16	5.4
1940	17	7.6
1941	18	8.9
1916	22	10.2
1943	26	11.5
1944	29	14.1
1947	37	18.3
1946	38	18.8
1945	41	19.1
1952	43	20.0
1956	44	20.6
1958	49	21.3
1962	51	22.1
1963	55	22.8

Short-term fluctuations are generally attributed to other factors, both economic and biological. The most important economic consideration is the price paid fishermen for their catch. The consistent influence of average price on lobster production is shown in table 3.

FEEDING AND GROWTH

Observations under natural, seminatural, and laboratory conditions indicate that lobsters eat both living and dead fish, mollusks, other marine invertebrates, and small quantities of marine plants.

The lobster is a comparatively slow-growing animal and is believed to be long-lived. Moulting depends upon growth and growth depends largely upon food intake. The frequency of feeding appears to be related to general activity which is influenced by water temperature. Post-moult feeding activity is high and is generally associated in Maine with seasonally high sea water temperatures. Those conditions concentrate the catch of lobsters in the five-month period, July to November, when about 75 percent of the annual catch is made.

Growth rates vary among individual lobsters. The frequency of moult varies and the actual growth increment made with each moult varies, although the average is about 14 percent in length and 50 percent in weight. From studies made in Maine (Taylor & Baird 1947, and Taylor 1949), it is likely that the most precocious lobsters in Maine waters reach minimum legal size when they are 4 years old. The number must be small and probably does not exceed 5 percent. The majority are believed to enter the fishery when they are 5 to 7 years old, while another small percentage may be 9 years of age or older before they reach minimum legal size.

Fig. 3 - A Maine lobster fisherman returns a sublegal lobster to the water.

MORTALITY

Stratified sampling of the catch supports the assumption that the resource is intensively exploited. A summary of those data arranged by moult-class groups is given in table 4. Natural and fishing mortality rate amounted to approximately 83 percent for recruits and 86 percent for the more catchable next larger (1st moult) size.

Table 4 - Total Lobster Mortality Rate and Percentage of Catch by Lobster Size Groups, 1949-1956

Carapace Size in Inches	Number of Lobsters Measured	Percentage of Catch	Percentage Decrease
		(%)	
$3\frac{1}{8}$ to $3\frac{1}{2}$ (recruits)	239,537	84	-
$3\frac{5}{8}$ to $4\frac{1}{8}$ (1st moult)	40,637	14	83
$4\frac{1}{4}$ to $4\frac{3}{4}$ (2nd moult)	5,552	2	86
$4\frac{7}{8}$ to 5 (3rd moult)	478	-	-
Total	286,204		

Table 5 - Natural Mortality

Carapace Size in Inches	Number of Lobsters	Percentage Decrease by $\frac{1}{8}$-Inch or Three-Month Intervals
$3\frac{1}{8}$	68,578	-
$3\frac{1}{4}$	63,908	6.9
$3\frac{3}{8}$	58,611	8.3
$3\frac{1}{2}$	48,440	-

Natural mortality appears to vary, but probably ranges from about 28 to 33 percent a year, as indicated by the data in table 5. Estimates are based on assumed annual moult in which carapace linear increment is approximately 14 percent.

SUPPLY

Until about 1958 the supply of lobsters had generally been adequate to meet demand requirements. It is now becoming increasingly evident that nearly all of the available legal population is being caught each year.

Annual landings have averaged 22 million pounds for the past 13 years. Landings have fluctuated from 20 to 24.4 million pounds during that period. Sampling showed that 79 percent of the catch in 1947 was made up of previously sublegal lobsters that became legal as a result of moulting. By 1952, that number had increased to 85 percent (table 6) and by 1953 to 86 percent. Since that time, it has been estimated that the amount has gone as high as 90 percent or more in some years. Landings have increased approximately 3 percent in weight for each percentage increase in the number of recruits in the catch.

Table 6 - Fishing Effort, Landings, and Composition of Catch in Maine Lobster Fishery

No. of Traps	Annual Landings	Percentage Recruits in Catch
		%
365	17.5	
	18.3	79
	18.8	80
437	19.2	
447	19.4	82
	20.1	84
	21.4	85
464	22.0	86
560	22.3	
745	22.3	

To catch the remaining supply--that is, for the catch to consist entirely of previously sublegal, moult-recruited stock--would require an eightfold increase in fishing effort even if the resource could support such an intensive fishery.

Estimates, based on the 1947-1956 sampling, indicate that the annual available legal lobster supply has varied from 23 to 28 million pounds as a result of differences in the rate of growth and recruitment. During the period 1951-1963, the average available legal supply of lobster in Maine has been calculated to have been 26 million pounds, with a range from 25 to 28 million.

Table 7 - Estimated Maine Lobster Supply

Fishing Effort (Average No. of Traps)	Percentage Recruits in Catch	Average Annual Landings
1,000	%	Millions of Lbs.
928	87	22.5
1,220	89	23.5
1,604	90	24.0
2,109	92	25.0
2,773	94	26.0
3,646	96	27.0
4,793	98	27.5
6,300	100	28.0

From those data, estimates of future production at varying levels of fishing effort based on catch composition and sea water temperature conditions of the period 1947-1956 are shown in table 7.

SEA WATER TEMPERATURE

The influence of fluctuations in sea water temperature appears to be most pronounced during the spring prior to moulting and subsequent recruitment to the legal-size range. The

Table 8 - April (1)-May (2) Sea Water Temperature and July-August Maine Lobster Landings for Selected Years		
Year	Temperature	Landings
	°F.	Millions of Lbs.
1953	50.0	8.1
1955	48.6	8.3
1954	48.5	8.1
1957	48.0	7.8
1952	47.6	7.1
1960	46.6	6.5
1958	45.8	6.0
1956	45.0	5.1
1959	44.8	5.3
1961	44.5	4.7
Note: Use of "April (1)-May (2)" is based on the assignment of 1 value of April sea water temperature to 2 of May.		

relationship of temperature to catch at the beginning of the new lobster year is shown in table 8.

That temperature influences are largely seasonal is indicated by table 9.

Fig. 4 - Winter scene on the east side near the Boothbay Harbor freezer wharf.

Table 9 - Relation of April (1)-May (2) Sea Water Temperature and Maine Lobster Landings During Subsequent Periods, 1953-1963								
Year	April-May Temperature	Landings						
		July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	°F.	(Millions of Lbs.)						
1953	50.0	3.4	4.7	4.1	2.6	1.9	1.5	18.2
1955	48.6	2.9	5.4	4.8	2.8	1.9	1.1	18.9
1954	48.5	2.9	5.3	4.1	2.9	1.9	1.1	18.2
1957	48.0	3.0	4.8	4.5	4.0	2.6	1.6	20.5
1960	46.6	2.3	4.2	4.9	4.1	2.5	1.5	19.5
1963	46.3	2.1	3.5	4.1	4.3	2.5	1.6	18.1
1958	45.8	2.2	3.8	4.2	3.2	2.2	1.4	17.0
1956	45.0	1.3	3.8	4.5	4.1	2.3	1.4	17.4
1959	44.8	1.9	3.4	4.7	3.9	2.6	1.5	18.0
1961	44.5	1.6	3.0	3.7	4.0	2.5	1.9	16.7
1962	44.3	1.9	3.6	4.7	4.2	2.7	1.2	18.3

METHODS OF PREDICTING AVAILABLE SUPPLY AND LANDINGS

From the data in table 9, tables for predicting lobster landings, available supply, and relative abundance were constructed (table 9a).

Table 9a - Tables for the Prediction of Maine Lobster Landings; Assessment of Relative Abundance and Availability by the Use of Sea Water Temperature							
April-May Sea Water Temperature	Landings in Certain Months						
	July	Aug.	Sept.	Oct.	Nov.	Dec.	6 Months Total
°F.	(Millions of Lbs.)						
50.0	3.4	5.3	4.1	2.6	1.9	1.1	18.4
49.0	3.3	5.3	4.1	2.8	1.9	1.1	18.5
48.5	3.0	5.3	4.1	3.0	2.0	1.1	18.5
48.0	2.9	4.8	4.2	4.0	2.5	1.5	19.9
47.5	2.5	4.5	4.2	4.0	2.5	1.5	19.2
46.5	2.3	4.2	4.2	4.1	2.5	1.5	18.8
46.3	2.2	3.8	4.2	4.2	2.5	1.5	18.4
46.0	2.2	3.8	4.2	4.2	2.5	1.5	18.4
45.0	1.9	3.8	4.5	4.2	2.5	1.5	18.4
44.8	1.9	3.4	4.7	4.2	2.6	1.5	18.3
44.5	1.7	3.2	4.7	4.2	2.6	1.6	18.0
44.3	1.6	3.2	4.7	4.2	2.7	1.6	18.0
Standard Error	±11.45%	±5.95%	±9.90%	±7.76%	±4.90%	±14.31%	±4.04%

Unfortunately the tables do not include available supplies and landings during the first six months of the calendar year, nor do they account for variations in fishing effort associated with differences in seasonal price paid fishermen for their catch.

The influence of supply on landed value and of landed value on fishing effort as indicated by subsequent landings is shown by table 10.

Table 10 - July-August Lobster Landings and Prices in Relation to Landings of the Following Year

Year	April-May Temperature	July-Aug. Landings	July-Aug. Price	Year	Jan.-June Landings	Jan.-Dec. Landings
	°F.	Million Lbs.	¢/Lb.		. . . . . . (Million Lbs.)	. . . . .
1953	50.0	8.1	33	1954	3.6	21.7
1955	48.6	8.3	32	1956	3.2	20.6
1954	48.5	8.1	34	1955	3.8	22.7
1957	48.0	7.8	35	1958	4.4	21.3
1952	47.6	7.1	42	1953	4.1	22.3
1960	46.6	6.5	44	1961	4.3	20.9
1963	46.3	5.6	60	1964	-	-
1958	45.8	6.0	50	1959	4.4	22.3
1956	45.0	5.1	50	1957	4.1	24.4
1959	44.8	5.3	51	1960	4.5	24.0
1961	44.5	4.7	59	1962	3.8	22.1
1962	44.3	5.6	53	1963	4.7	22.8

Modifications of these data for use as prediction tables are shown in table 10a.

Table 10a - Tables for the Prediction of Maine Lobster Landings and Relative Abundance Based on Demand Modified by Sea Water Temperature

April-May Temperature	July-Aug. Landings	July-Aug Price	Year Following	
			Jan.-June	Jan.-Dec.
°F.	Million Lbs.	¢/Lb.	. . (Million Lbs.)	. .
50.0	8.3	32	3.2	20.5
49.0	8.2	33	3.6	21.5
48.5	8.1	34	3.8	22.0
48.0	7.8	35	4.0	22.0
47.5	7.1	42	4.1	22.5
46.5	6.5	44	4.3	22.5
46.3	6.0	50	4.4	22.5
45.8	5.8	51	4.5	22.5
45.0	5.6	53	4.5	24.5
44.8	5.3	55	4.6	24.0
44.5	5.1	57	4.7	23.0
44.3	4.7	60	4.9	22.0
Standard Error	±6.93%	±5.13%	±3.96%	±4.52%

Table 11 - April-May Sea Water Temperature (Boothbay Harbor) and Annual Lobster Landings (York County)

Year	April-May Sea Water Temperature	Change from Preceding Year	Predicted Landings	Landings
	°F.	± in °F.	Million Lbs.1/	Million Lbs.
1962	44.3	- .2	1.4	1.5
1961	44.5	-2.1	1.5	1.5
1960	46.6	+1.8	1.7	1.7
1959	44.8	-1.0	1.4	1.5
1958	45.8	-2.2	1.6	1.4
1957	48.0	+3.0	1.7	1.8
1956	45.0	-3.6	1.4	1.5
1955	48.6	+ .1	1.5	1.6
1954	48.5	-1.5	1.5	1.5
1953	50.0	+2.4	1.4	1.6
Standard Error ±7.70%				

1/Based on ±5% fluctuation with each °F. change in temperature.

Since supply in recent years has been inadequate to meet demand, biological and environmental factors have become increasingly critical. Demand has increased and will remain high for the forseeable future. Methods of precise prediction of future supplies will have to be based on sea water temperature with its influence on the rate of growth and recruitment and the level of fishing effort, rather than on price factors alone. With the current level of fishing intensity the effects of environmental changes on supply will become evident as deviations from predicted availability and relative abundance. Evidence of the past 13 years suggests that available abundance fluctuates approximately 5 percent with each degree of April-May temperature change.

Application of this evidence to probably the most intensive lobster fishery in Maine, that of York County, for purposes of prediction, and an evaluation of the accuracy of the predictions is shown in table 11.

EFFORT, TEMPERATURE, AND PRODUCTION

The relationship among annual landings, sea water temperature, and fishing effort is best illustrated by table 12 in which various levels of production are shown with the effort and temperature which produced them.

Table 12 - Relationship Among Annual Landings, Sea Water Temperature, and Fishing Effort

Year	April-May Temperature	No. of Traps	Landings
	°F.	1,000	Million Lbs.
1957	48.0	565	24.4
1960	46.6	745	24.0
Average	47.3	655	24.2
1953	50.0	440	22.3
1955	48.6	532	22.7
1963	46.3	731	22.8
1959	44.8	717	22.3
1962	44.3	767	22.1
Average	46.8	636	22.4
1954	48.5	488	21.7
1958	45.8	609	21.3
1961	44.5	752	20.9
Average	46.3	616	21.3
1952	47.6	417	20.0
1956	45.0	533	20.6
Average	46.3	475	20.3

Table 13 - Fluctuations in April-May Sea Water Temperature and Corresponding Changes in Fishing Effort to Maintain Constant Production, 1941-1963

Temperatures	Number of Traps
°F.	1,000
-5.7	+327
-5.2	+277
-4.4	+369
-4.3	+235
-4.2	+279
-3.9	+150
-3.8	+185
-3.7	+291
-3.7	+229
-3.1	+226
-2.7	+121
-2.6	+116
-2.3	+199
-1.7	+ 95
-1.5	+180
-1.5	+ 48
-1.4	+ 92
-1.3	+143
- .5	+219
- .5	+ 50
+ .3	+ 43
+ .4	- 7
+ .7	- 86
+1.0	- 43
+1.5	+ 14
+2.0	+ 84
+3.7	- 11

With sea water temperature influencing seasonal supply and landed value influencing effort, fishermen have generally responded to changes in temperature by adjustments in effort.

Although this relationship is less precise than it is with some other factors, it does indicate a collective response, conscious or otherwise, of fishermen to temperature fluctuations. A summary of this relationship is shown in table 13.

Since 1941 there have been 27 paired years in which landings have fluctuated 600,000 pounds or less, averaging no more than 3 percent. The relationship of declining effort to increases in temperature or relatively minor changes in temperature and of greatly increased effort to major declines in temperature is illustrated by table 13.

SUSTAINED YIELD

Examination of all the data and their relationships suggests that under existing legal and social conditions of the fishery, a sustained annual yield of 22 million pounds is possible by the proper application of this information.

Sampling of fishermen for the length of the fishing year indicates an average of 130 days. With fishing effort ranging from 383,000 to 800,000 traps and having an average 6.5 percent increase per year since 1951, despite some declines in temperature, the data from table 13 have been used to construct the graph shown in figure 5 as well as to prepare table 14.

Selected pairs of years in which average landings ranged from 21.5 to 22.5 million pounds have been used to find out what fishing effort (number of traps) has to be used at any given April-May sea water temperature level between 44.5° and 49.5° F. to produce 22 million pounds of lobster.

The curve of figure 5 represents sustained yield at 22 million pounds. Deviations as they have occurred within the limits of 21.5 to 22.5 million pounds are indicated. In those years

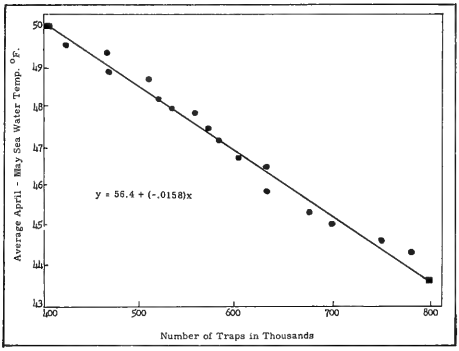


Fig. 5 - Sustained annual yield of 22 million pounds in Maine lobster fishery.

Table 14 - A Type of Management for Sustained Yield in the Maine Lobster Fishery

Years	Average April-May Sea Water Temperature	Average Lobster Landings	Number of Fishing Units (Traps) Needed to Catch 22 Million Pounds
	°F.	Million Lbs.	1,000
1951-53	49.5	21.6	421
1953-54	49.3	22.0	464
1951-55	48.8	21.8	468
1954-55	48.6	22.2	505
1949-57	48.2	21.9	516
1953-58	47.9	21.8	530
1951-60	47.8	22.4	554
1955-58	47.2	22.0	571
1952-60	47.1	22.0	581
1954-59	46.7	22.0	603
1954-62	46.4	21.9	630
1956-60	45.8	22.3	630
1958-59	45.3	21.8	675
1958-62	45.1	21.7	697
1959-61	44.7	21.6	749
1961-62	44.4	21.5	778

when average landings were greater or less than 22 million pounds, the number of traps has been adjusted up or down on a percentage basis.

This application of research findings illustrates how biological and economic information might be used to bring about the ultimate objective of conservation--sustained annual yield of a resource at the best level possible.

LITERATURE CITED

DOW, ROBERT L.

1962. Use of Environmental and Economic Factors to Check Biological Fluctuations in Maine Lobster Population. Commercial Fisheries Review, vol. 24, no. 8 (August), pp. 6-8. (Sep. No. 654.)

1961. Some Factors Influencing Maine Lobster Landings. Commercial Fisheries Review, vol. 23, no. 9 (September), pp. 1-11. (Sep. No. 627.)

_______, and T. T. TROTT

1956. A Study of Major Factors of Maine Lobster Production Fluctuations. Dept. of Sea and Shore Fisheries, Augusta, Maine, ms.

TAYLOR, CLYDE C.

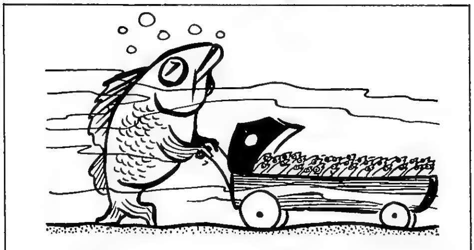
1951. A Method of Inferring the Annual Growth Increment of Lobsters from Length-Frequency Measurements. Fish. Cir. no. 3, Dept. of Sea and Shore Fisheries, Augusta, Maine, ms, reprinted, May.

1950. A Review of Lobster Rearing in Maine. Research Bul. no. 5, Dept. of Sea and Shore Fisheries, Augusta, Maine, ms.

1949. The Schoodic Lobster Planting Experiments (supp. 1). Fish. Cir. no. 5, Dept. of Sea and Shore Fisheries, Augusta, Maine, ms.

_______, and F. T. BAIRD

1947. The Schoodic Lobster Planting Experiments. Fish. Cir. no. 2, Dept. of Sea and Shore Fisheries, Augusta, Maine, ms.



Prolific fish—such as carp—often deposit as many as 150,000 eggs annually.

TRAWLING RESULTS OF THE R/V ANTON BRUUN IN THE BAY OF BENGAL AND ARABIAN SEA

By A. T. Pruter*

SUMMARY

Trawling surveys in the Bay of Bengal and in the Arabian Sea were conducted in 1963 from the National Science Foundation research vessel Anton Bruun as part of the United States contribution to the International Indian Ocean Expedition. Relatively small shrimp catches obtained may reflect a distribution of shrimp concentrations in shallower waters than were surveyed. Demersal fish in the Bay of Bengal generally were similar to those observed in the Arabian Sea. Stingray dominated the catches in all regions at depths less than 50 fathoms.

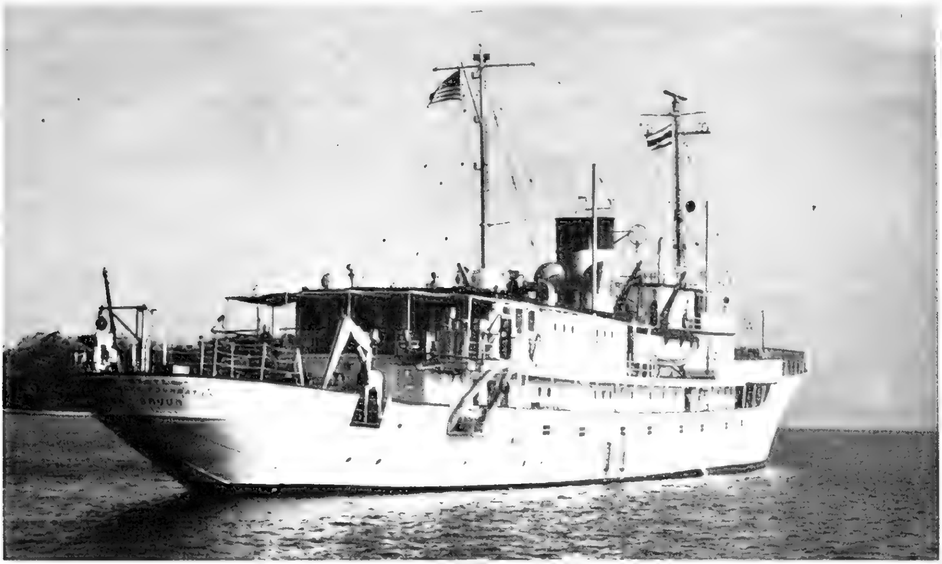


Fig. 1 - United States National Science Foundation research vessel Anton Bruun at anchor off Phuket, Thailand, during Cruise 1 in the Bay of Bengal.

Largest fish catches were taken off Muscat and Oman (Arabia). The precipitous and uneven ocean bottom at depths greater than about 100 fathoms in both the Bay of Bengal and the Arabian Sea, together with relatively few demersal fish at such depths, would seem to hinder if not preclude developing deep-water trawl fisheries.

INTRODUCTION

The International Indian Ocean Expedition (I.I.O.E.) is sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) with the cooperation of the Inter-

*Fishery Biologist, Exploratory Fishing and Gear Research Base, U. S. Bureau of Commercial Fisheries, Seattle, Wash.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 717

national Council of Scientific Unions. It is an unprecedented, cooperative, international study of the seas, and represents the first attempt to study scientifically an entire ocean. More than 40 vessels and several hundred scientists from many nations are participating in the 3-year program. Information on the Indian Ocean will permit more accurate weather forecasting, charting sea currents, and more economical navigational routes, locating latent fisheries resources, and compiling new hydrographic charts.

From March 12 to May 10, 1963, and from November 12 to December 10, 1963, trawling surveys of the Bay of Bengal and the Arabian Sea, respectively, were conducted from the National Science Foundation research vessel Anton Bruun (fig. 1). Those surveys were part of the participation in the I.I.O.E. in which various governmental groups and educational and private institutions are participating.

The scientific program from the 243-foot Anton Bruun (formerly the Presidential yacht Williamsburg) is directed by the Woods Hole Oceanographic Institution. During its 2-year assignment in the Indian Ocean, the Anton Bruun has a permanent staff of oceanographers to provide continuity in the basic oceanographic program. Visiting scientists from the United States and other countries participate in individual cruises. Personnel from the U. S. Fish and Wildlife Service's Bureau of Commercial Fisheries participate in most of the cruises from the Anton Bruun, and on 4 of the cruises involving fisheries surveys[1/] they direct the fishing activities. Overall direction and coordination of the Bureau of Commercial Fisheries participation in the Indian Ocean program is being provided by the Bureau's Biological Laboratory in Honolulu. Scientists and fishermen from the Bureau's Exploratory Fishing and Gear Research Base at Seattle and from the Biological Laboratory in Honolulu directed exploratory trawling activities on Cruises 1 and 4B. This report discusses the trawling results of those two cruises. Reports on hydrographic, ichthyological, and other activities during the cruises will be published elsewhere by the investigators concerned with such studies.

Thirty-one exploratory hauls with a Gulf of Mexico shrimp trawl were made on Cruise 1 in the Bay of Bengal. Hauls were made off the west coast of Thailand, near the Andaman Islands, off Burma, and off East Pakistan. The trawling phase of Cruise 1 ended 1 month earlier than planned due to malfunction of the trawl winch. On Cruise 4B, 86 trawl hauls were made in the Arabian Sea off northwest India, off West Pakistan, in the Gulf of Oman, and off Muscat and Oman (Arabia).

Commercial trawl fisheries for shrimp and fish in the Bay of Bengal and in the Arabian Sea are restricted to relatively shallow waters of a maximum depth of about 40 fathoms and generally less than 20 fathoms. Exploratory trawling on Cruises 1 and 4B was primarily designed to provide information on fish and shrimp resources in regions and at depths not presently exploited.

On Cruise 1 in the Bay of Bengal the vessel track was chosen to accommodate both oceanography and exploratory fishing; on Cruise 4B in the Arabian Sea, exploratory fishing only.

GEAR AND METHODS

Nylon Gulf of Mexico shrimp trawls (Schaefers and Johnson 1957) measuring 42 feet along the footrope and having a mesh size of $1\frac{1}{2}$ inches (stretched measurement, opening including one knot) were used on both cruises. The trawl was connected by a 25-fathom-long bridle to a single towing warp. A rectangular otter board measuring $2\frac{1}{2}$ feet by 5 feet and weighing 160 pounds was attached to each wing of the net when trawling to depths of 200 fathoms. Below 200 fathoms heavier boards (260 pounds each) were used.

The shrimp trawl was towed from an A-frame on the starboard side of the Anton Brunn. A hydraulic crane located aft of the A-frame lifted the net and doors outboard and inboard and lifted the cod end of the net aboard after each haul. A "lazy line"--a nylon rope with a loop on one end passing through puckering rings on the forward portion of the cod end--was used to pull the net alongside the Anton Bruun and to lift the cod end aboard.

1/Cruises 2 and 5 are tuna surveys employing pelagic long-line gear; Cruises 1 and 4B are bottom-trawling surveys.

Echo-sounding tracings of the ocean bottom were obtained whenever the Anton Bruun was under way. They were supplemented by more detailed soundings prior to trawling and by samples of bottom sediments obtained with a small dredge or a spring-loaded bottom grab.

The Anton Bruun is powered by two main engines supplemented by an active rudder. Using the port engine the vessel moved at 6 to 8 knots during setting of the trawl. When approximately 50 to 100 fathoms of cable remained to be let out on each haul, the vessel was slowed by reducing speed of the port engine as low as possible and running the active rudder in reverse. This was done in an attempt to have the vessel proceeding at standard trawling speed when the trawl reached the ocean bottom. Either the port engine, the active rudder, or a combination of both was used to maintain trawling speed after the net reached the ocean bottom. Trawling speed ranged between 2 and $3\frac{1}{2}$ knots.

The ratio between the amount of towing warp out and the depth to bottom was greater in shallow water than in deep water, ranging from 6 to 1 (6 fathoms of cable to 1 fathom of depth) in less than 20 fathoms to approximately $2\frac{1}{2}$ to 1 at 1,000 fathoms. To ensure that the trawl reached bottom, a practice was followed of using slightly higher ratios than were found satisfactory in exploratory trawling with identical gear in the northeastern Pacific Ocean (Pereyra 1963).

Duration of the hauls varied between 30 and 60 minutes, counted as the time the net was on the bottom. Catches were emptied onto a sorting table and separated by family (genera or species when possible). Each group was examined (1) to determine the number of individuals present and their total weight, and (2) to estimate their range in length by measuring the total lengths of the smallest and largest individuals present. Length frequencies were obtained from representative samples of some groups of fishes. For the larger shrimp catches, estimates of the number of whole (heads on) shrimp per pound were recorded.

REGIONS SURVEYED

Locations of trawl stations in the Bay Bengal and in the Arabian Sea are shown in figures 2 and 3. The topography of the continental shelf (depths to 100 fathoms) in all regions surveyed was generally suitable for trawling except off Muscat and Oman and in the Gulf of Oman where numerous coral outcroppings were encountered. Green mud was the dominant bottom sediment in both the Bay of Bengal and the Arabian Sea. The continental slope was precipitous and uneven in all regions surveyed. This precluded much trawling at depths greater than about 100 fathoms.

For convenience in analyzing the distribution and relative abundance of fish and shrimp encountered, the survey regions were divided into the following areas: Andaman Islands, Thailand, Burma, East Pakistan, northwest India, West Pakistan, Gulf of Oman, and Muscat and Oman (Arabia). Areas were subdivided into the following depth intervals: 8-49 fathoms, 50-99 fathoms, 100-199 fathoms, 200-299 fathoms, and 1,000-1,099 fathoms (no trawling from 300 to 999 fathoms).

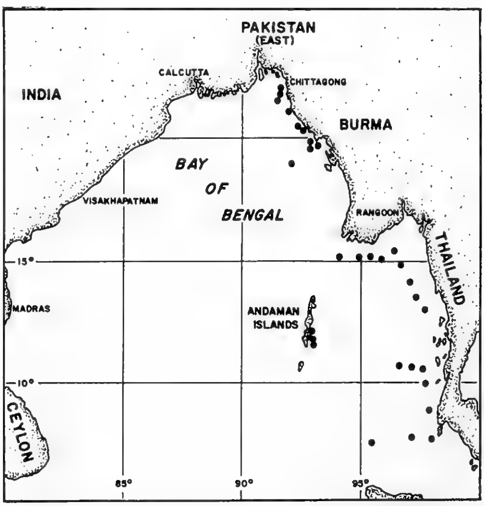


Fig. 2 - Location of trawl stations, cruise 1 of R/V Anton Bruun.

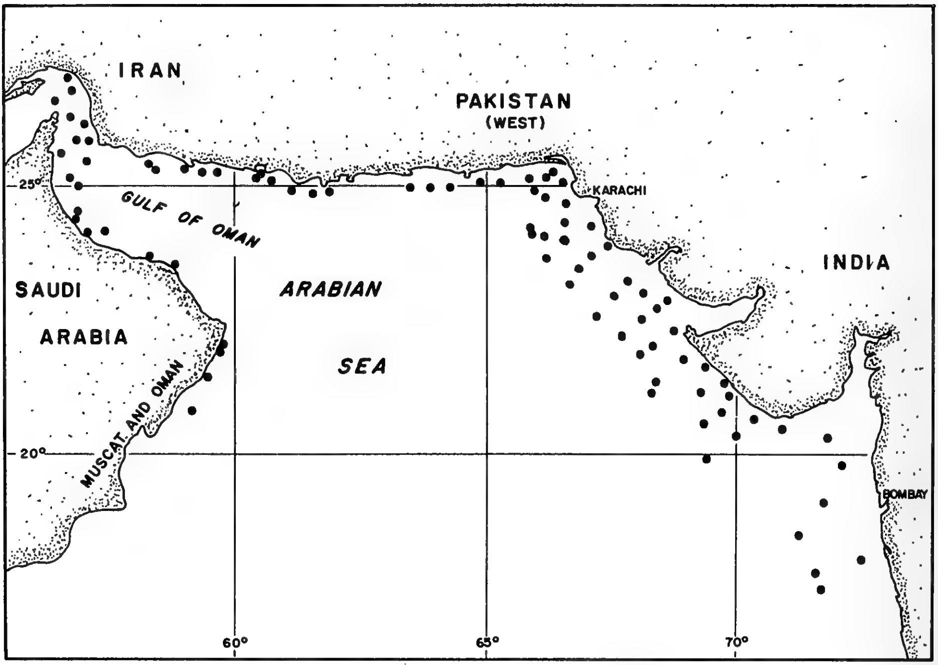


Fig. 3 - Location of trawl stations, Cruise 4B of R/V Anton Bruun.

RESULTS

Thirty-one trawl hauls were made in the Bay of Bengal; 27 were successful and 4 resulted in extensive damage to the nets. In the Arabian Sea 86 trawl hauls were completed; 77 were successful and 9 resulted in extensive damage to nets. The highest incidence of gear damage occurred off Muscat and Oman where one-half of the hauls were unsuccessful and in the Gulf of Oman where the nets were extensively damaged in one-quarter of the hauls.

Fishing effort and catch rates for fish and shrimp by areas and depth intervals in the Bay of Bengal and the Arabian Sea are shown in tables 1 and 2. Because of the few trawl hauls and the probable low catching efficiency of the shrimp trawl, it is impossible to assess the commercial potential of fish and shrimp inhabiting the various areas. The surveys do provide, however, an indication of the relative abundance of fish and shrimp between areas.

Greatest survey effort was expended in the depth range 8-49 fathoms, the shallowest zone surveyed. Within this depth range best coverage was attained off northwest India and off West Pakistan, where totals of 22 and 16 successful trawl hauls were completed (table 2).

In the depth zone 50-99 fathoms, best survey coverage was attained off northwest India, off West Pakistan, and in the Gulf of Oman where from six to seven successful trawl hauls were completed in each area (table 2).

Maximum survey effort in the depth range 100-199 fathoms was expended in the Gulf of Oman (four successful hauls) and off northwest India and West Pakistan (two successful hauls

in each region). Only one successful haul was made in the depth interval 200-299 fathoms and one in the 1,000- to 1,099-fathom interval. Both of the latter hauls were made off Burma.

Table 1 - Number of Successful Trawl Hauls, Fishing Effort, and Catch Rates by Areas and Depth Zones in the Bay of Bengal, R/V Anton Bruun, March-April 1963

Depth Interval, Fishing Effort, and Catch Rates	Andaman Islands	Thailand	Burma	East Pakistan
8-49 fathoms				
Number of hauls	2	2	12	6
Hours trawled	1.0	1.0	8.0	3.9
Pounds fish/hour trawled .	58	50	107	157
Pounds shrimp/hour trawled	0	1	6	5
50-99 fathoms				
Number of hauls	1	0	0	0
Hours trawled	0.5	-	-	-
Pounds fish/hour trawled .	4	-	-	-
Pounds shrimp/hour trawled	0	-	-	-
100-199 fathoms				
Number of hauls	0	0	1	0
Hours trawled	-	-	0.5	-
Pounds fish/hour trawled .	-	-	68	-
Pounds shrimp/hour trawled	-	-	56	-
200-299 fathoms				
Number of hauls	0	1	1	0
Hours trawled	-	0.6	0.5	-
Pounds fish/hour trawled .	-	21	80	-
Pounds shrimp/hour trawled	-	9	34	-
1,000-1,099 fathoms				
Number of hauls	0	0	1	0
Hours trawled	-	-	1.0	-
Pounds fish/hour trawled .	-	-	2	-
Pounds shrimp/hour trawled	-	-	trace	-

BAY OF BENGAL: Fish: 8- to 49-Fathom Interval: Highest catch rates of fish in the Bay of Bengal occurred in the 8- to 49-fathom depth interval off Burma and off East Pakistan where 107 and 157 pounds of fish, respectively, were caught per hour of trawling (table 1). In those regions and in this depth interval, stingray (Dasyatidae) and guitarfish (Rhinobatidae) dominated the catches. Other fish which comprised an important part of the catches were drum (Sciaenidae), lizardfish (Synodontidae), and snapper (Lutjanidae). Some miscellaneous fish taken included sea catfish (Ariidae), threadfin (Polynemidae), and tonguefish (Cynoglossidae).

50- to 99-Fathom Interval: The only haul in this depth interval was made in the Andaman Islands area and was unproductive, yielding only 4 pounds of fish per hour of trawling (table 1). Included in the catch were a number of small threadfin-bream (Nemipteridae), cardinalfish (Apogonidae), lizardfish, goatfish (Mullidae), and mackerel (Scombridae).

100- to 199-Fathom Interval: The single haul in this depth interval was made off Burma and provided 68 pounds of fish per hour of trawling. Chlorophthalmid (Chlorophthalmidae) was the dominant group encountered, accounting for over one-half the total fish catch by weight. Chlorophthalmid were followed in order of abundance by scorpionfish (Scorpaenidae) and butterfish (Stromateidae). Miscellaneous species taken included bembropsid (Bembropsidae), requiem shark (Carcharinidae), grenadier (Macruridae), bigeyes (Priacanthidae), and tripodfish (Triacanthidae).

200- to 299-Fathom Interval: Single hauls were made off Thailand and Burma in this depth interval. Off Burma, hatchetfish (Sternoptychidae) were the dominant group encountered, accounting for over 70 percent of the total fish catch by weight. Hatchetfish were followed by requiem shark, grenadier, cutlassfish (Trichiuridae), and chlorophthalmids. Off Thailand, skate (Rajidae), sea robbin (Peristediidae), and boafish (Stomiatidae) dominated the catches.

1,000- to 1,099-Fathom Interval: The one successful trawl haul made in the 1,000- to 1,099-fathom interval off Burma yielded a catch rate of 2 pounds per hour of trawling. The catch consisted of one snipe eel (Nemichthyidae), four boafish, several eel larvae, and a number of unidentified fish.

The largest fish encountered in the Bay of Bengal were stingray and guitarfish which attained maximum estimated weights of 200 and 225 pounds, respectively.

Fig. 4 - Shrimp-trawl catch in Bay of Bengal, Cruise 1 of R/V Anton Bruun.

Shrimp: With the exception of the Andaman Islands area, shrimp were taken in all depth zones and in all areas surveyed in the Bay of Bengal. However, no large catches were obtained in any area. Off Burma, several individual hauls made at depths between 14 and 35 fathoms yielded from 10 to 20 pounds of shrimp per hour of trawling. Two $\frac{1}{2}$-hour hauls off Burma in 165 and 200 fathoms of water yielded 28 and 17 pounds of shrimp, respectively.

Most of the shrimp belonged to the family Penaeidae (genera *Penaeus* and *Metapenaeus*) and to the tribe Caridea. They generally were small, ranging from 200 to 300 heads-on count per pound, although a few penaeid shrimp weighing over one-half pound each were caught.

ARABIAN SEA: Fish: 8-to 49-Fathom Interval: Highest catch rates of fish in the Arabian Sea occurred off Muscat and Oman in the 8- to 49-fathom depth interval (table 2) where four trawl hauls were made. Numerous coral outcroppings in that area resulted in extensive damage to the trawl nets on 2 of the 4 hauls. Of the two successful hauls, one of 30 minutes made at 23 fathoms yielded an estimated 5,500 pounds of stingray plus 100 pounds of other fish; the other (45 minutes) made at 25 fathoms yielded 1,700 pounds of fish--primarily grunt (Pomadasyidae), stingray, and cardinal fish--and 1,840 pounds of swimming crab (Portunidae).

Table 2 - Number of Successful Trawl Hauls, Fishing Effort and Catch Rates by Areas and Depth Zones in the Arabian Sea, R/V *Anton Bruun*, November-December 1963

Depth Interval, Fishing Effort, and Catch Rates	Northwest India	West Pakistan	Gulf of Oman	Muscat & Oman (Arabia)
8-49 fathoms				
Number of hauls	22	16	9	2
Hours trawled	16.4	11.9	6.5	1.3
Pounds fish/hour trawled .	214	137	64	5,840
Pounds shrimp/hour trawled	8	trace	1	trace
50-99 fathoms				
Number of hauls	7	7	6	0
Hours trawled	5.5	6.1	4.1	-
Pounds fish/hour trawled .	132	246	118	-
Pounds shrimp/hour trawled	1	1	1	-
100-199 fathoms				
Number of hauls	2	2	4	0
Hours trawled	2.0	2.0	4.0	-
Pounds fish/hour trawled .	22	2	45	-
Pounds shrimp/hour trawled	trace	6	8	-

Catch rates in the 8- to 49-fathom depth interval off northwest India, West Pakistan, and in the Gulf of Oman were much lower than off Muscat and Oman, ranging from 64 to 214 pounds of fish per hour of trawling (table 2). Stingray again were dominant, accounting for from one-half to one-third of the total fish catches by weight. Other important species in all areas were threadfin-bream and drum. Grunt were numerous off West Pakistan and off Muscat and Oman. The apparent distribution of Bombay duck (Harpadontidae), a commercially important group in India, was interesting in that they were caught in substantial numbers in the Arabian Sea only off northwest India in the Gulfs of Kutch and Cambay and only in relatively shallow water (8-20 fathoms).

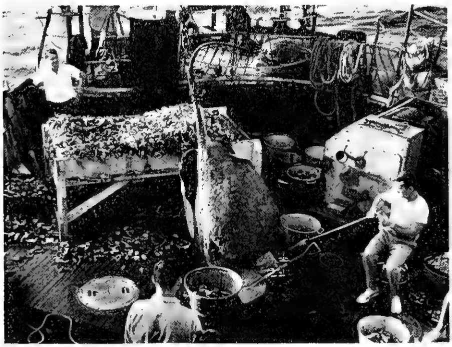


Fig. 5 - Catch of fish and swimming crabs taken in shrimp trawl off Muscat and Oman (Arabia), Cruise 4B of R/V *Anton Bruun*.

50- to 99-Fathom Interval: No trawling was conducted below 49 fathoms off Muscat and Oman. Catch rates in the depth interval 50-99 fathoms off West Pakistan and in the Gulf of Oman were higher than in the shallower interval surveyed in these regions. In contrast, off northwest India the catch rate in this interval was less than that in the shallower 8- to 49-fathom interval. Within the 50- to 99-fathom interval, stingray comprised an important part of the catches only off West Pakistan. Threadfin-bream were as important in the catches in all areas surveyed as in shallower water. Although drum and grunt were taken, they occurred less often in most areas than in the shallower 8- to 49-fathom interval. Other fish accounting for much of the catches in this interval included jack (Carangidae), sea bass (Serranidae), and lizardfish. Off West Pakistan and in the Gulf of Oman, monocle-bream (Scolopsidae) were important in the catches; however, relatively few were caught in other areas.

100- to 199-Fathom Interval: Off northwest India, West Pakistan, and in the Gulf of Oman, the catch rates declined markedly in this interval compared to those in shallower intervals (table 2). Drum and cardinalfish formed important parts of the catches in all areas. Stingray were not taken in this depth interval in any area. Off northwest India, Champsodontidae was the dominant family of fish encountered but they were virtually absent from catches off West Pakistan and in the Gulf of Oman. Threadfin-bream comprised an important part of the catches off northwest India.

The largest fish captured in the Arabian Sea were stingray, which attained a maximum estimated weight of 450 pounds. One haul made off Muscat and Oman contained approximately 5,500 pounds of stingray estimated at 40 pounds each. Occasional large guitarfish (approximately 400 pounds) were caught. Some other relatively large fish caught during the survey were false conger eel (Muraenesocidae) which ranged up to 14 pounds in weight apiece, drum of up to 22 pounds each, and threadfin of up to 15 pounds each. Many of the more abundant fish in the catches were relatively small. Grunt averaged about one-half pound and attained a maximum weight of approximately 4 pounds. Threadfin-bream averaged about one-tenth pound each. Lizardfish averaged only a few ounces, but occasional specimens ranged up to $1\frac{1}{2}$ pounds. Monocle-bream, cardinalfish, and flathead (Platycephalidae) all averaged only a few ounces in weight.

Shrimp: Shrimp were taken in all depth zones and in all regions surveyed in the Arabian Sea. Catches in all regions and depth zones, however, were disappointingly small. Best catches were taken off northwest India in the 8- to 49-fathom depth interval, and in the Gulf of Oman and off West Pakistan in the 100- to 199-fathom depth interval (table 2). The largest single haul of shrimp taken in the Arabian Sea survey was 66 pounds, caught in a 45-minute haul off northwest India at a depth of 18 fathoms. The next largest single haul was 30 pounds taken in a 1-hour haul in the Gulf of Oman at a depth of 163-170 fathoms. A 40-minute haul off northwest India in the Gulf of Cambay in 15 fathoms produced 28 pounds of Caridean shrimp (*Paleomon*).

Most of the shrimp belonged to the family Penaeidae (genera *Penaeus*, *Metapenaeus*, and *Solenocerina*) and to the tribe Caridea. As in the Bay of Bengal survey, the shrimp generally were small, although occasional hauls yielded fair numbers of 40 to 50 heads-on count per pound.

Many sea snake (Hydrophidae) were caught in the small-mesh shrimp trawls in both the Bay of Bengal and in the Arabian Sea. Because they are extremely poisonous, the snakes must be handled with care when removing them from the net or from the catches. Use of larger-mesh trawls should reduce the catch of snakes.

DISCUSSION

Catching ability of the *Anton Bruun* may have been impaired in shallow water due to mud being stirred up from the ocean bottom by the vessel's wake. This was noticeable in depths of about 12 fathoms and less and may have frightened some shallow-water animals away from the path of the trawl. At those depths, the catching efficiency of a smaller vessel with a shallower draft might have been higher than that of the *Anton Bruun*.

Shrimp catches in the Bay of Bengal and in the Arabian Sea were surprisingly small in view of the large commercial shrimp fisheries there. The commercial fisheries, however, occur in shallower waters than were explored from the *Anton Bruun*. Shrimp appeared about equally available throughout all depth intervals surveyed out to a depth of 299 fathoms. The larger penaeid shrimp, however, were caught in the shallower depth intervals.

Largest fish catches were taken off Muscat and Oman where two successful trawl hauls in the depth interval 8-49 fathoms yielded a catch rate over 20 times as high as that obtained in any other region or depth interval. Although catches off Muscat and Oman primarily consisted of stingray and swimming crab for which there is no market, one 45-minute haul yielded 980 pounds of grunt. It seems probable that further explorations there would locate large populations of other more desirable species.

Off northwest India, West Pakistan, and in the Gulf of Oman, demersal fish appeared as abundant in the 50- to 99-fathom interval as in the shallower 8- to 49-fathom interval. Trawling effort in other areas was too inadequate in the 50- to 99-fathom interval to provide a meaningful comparison. Relative abundance of fishes at depths greater than 99 fathoms declined markedly in all areas surveyed.

Within the depth interval 8-49 fathoms in all areas surveyed, elasmobranchs, primarily stingray, dominated the catches. The relative importance of stingray in the catches decreased greatly in the 50- to 99-fathom interval and they were virtually absent in hauls made below 99 fathoms.

Demersal fish in the Bay of Bengal generally appeared similar to those observed in the Arabian Sea. In both regions, stingray, guitarfish, threadfin-bream, drum, lizardfish, threadfin, and cardinalfish were among the dominant groups encountered on the continental shelf. Grunt were important constituents of the fish fauna throughout most of the Arabian Sea; however, in the Bay of Bengal they were caught only off Burma and only in small quantities.

Throughout most of the Bay of Bengal and Arabian Sea, the precipitous and uneven ocean bottom at depths greater than 100 fathoms prevented trawling. This factor, together with an apparent reduction in abundance of demersal fishes, would seem to hinder if not preclude future development of major commercial trawl fisheries at depths greater than about 100 fathoms.

LITERATURE CITED

PEREYRA, WALTER T.
1963. Scope Ratio-Depth Relationships for Beam Trawl, Shrimp Trawl, and Otter Trawl. Commercial Fisheries Review, vol. 25, no. 12 (December). (Sep. No. 696.)

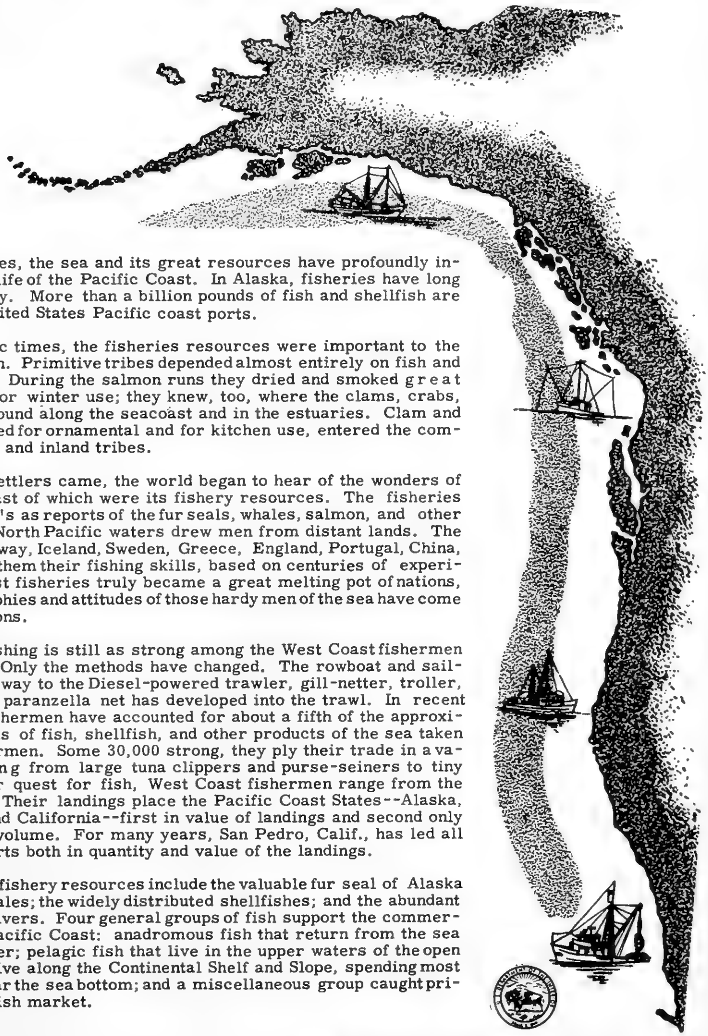
SCHAEFERS, EDWARD A, and HAROLD C. JOHNSON
1957. Shrimp Explorations off the Washington Coast, Fall of 1955 and Spring 1956. Commercial Fisheries Review, vol. 19, no. 1 (January). (Sep. No. 465.)

NEW WEATHER MACHINE DEVELOPED TO PREDICT WEATHER

Some of the drudgery experienced daily by the weather forecasters, and perhaps some of the vilification, may be reduced in the near future by the use of a machine, called the learning machine, which can be fed and taught to recognize geometric patterns found in weather formations.

The machine is called ADALINE (short for adaptive linear neuron) and learns its own mathematical procedures for processing meteorological data fed to it in training on weather patterns. Developed at Stanford University, the machine is now trained on some 200 weather patterns taken from weather records over the past five years and has been amazingly accurate in its predictions. (Sea Secrets, April 1964.)

UNITED STATES PACIFIC COAST COMMERCIAL FISHERIES



Since earliest times, the sea and its great resources have profoundly influenced the pattern of life of the Pacific Coast. In Alaska, fisheries have long been the chief industry. More than a billion pounds of fish and shellfish are landed each year in United States Pacific coast ports.

Even in prehistoric times, the fisheries resources were important to the inhabitants of the region. Primitive tribes depended almost entirely on fish and shellfish for their food. During the salmon runs they dried and smoked great quantities of salmon for winter use; they knew, too, where the clams, crabs, and abalone were to be found along the seacoast and in the estuaries. Clam and abalone shells, treasured for ornamental and for kitchen use, entered the commerce between coastal and inland tribes.

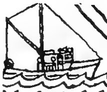
When the white settlers came, the world began to hear of the wonders of the region, not the least of which were its fishery resources. The fisheries boomed in the mid-1800's as reports of the fur seals, whales, salmon, and other species to be taken in North Pacific waters drew men from distant lands. The fishermen of Italy, Norway, Iceland, Sweden, Greece, England, Portugal, China, and Japan brought with them their fishing skills, based on centuries of experience. The Pacific Coast fisheries truly became a great melting pot of nations, and many of the philosophies and attitudes of those hardy men of the sea have come down to later generations.

The tradition of fishing is still as strong among the West Coast fishermen as in those early days. Only the methods have changed. The rowboat and sailboat largely have given way to the Diesel-powered trawler, gill-netter, troller, and purse-seiner; the paranzella net has developed into the trawl. In recent years Pacific Coast fishermen have accounted for about a fifth of the approximately 5 billion pounds of fish, shellfish, and other products of the sea taken by United States fishermen. Some 30,000 strong, they ply their trade in a variety of boats, ranging from large tuna clippers and purse-seiners to tiny fishing craft. In their quest for fish, West Coast fishermen range from the Bering Sea to Peru. Their landings place the Pacific Coast States--Alaska, Washington, Oregon, and California--first in value of landings and second only to the Gulf States in volume. For many years, San Pedro, Calif., has led all other United States ports both in quantity and value of the landings.

The Pacific Coast fishery resources include the valuable fur seal of Alaska and the far-ranging whales; the widely distributed shellfishes; and the abundant fishes of the sea and rivers. Four general groups of fish support the commercial fisheries of the Pacific Coast: anadromous fish that return from the sea to spawn in fresh water; pelagic fish that live in the upper waters of the open sea; groundfish that live along the Continental Shelf and Slope, spending most of their lives on or near the sea bottom; and a miscellaneous group caught primarily for the fresh-fish market.

--Conservation Note 15, "Commercial Fisheries of the Pacific Coast," Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C. 20240.

GOURMET'S GUIDE TO GOOD EATING



When in Seattle...

CRISPY BROILED SALMON

- 2 pounds salmon steaks or other fish steaks, fresh or frozen
- ½ cup butter or margarine, melted
- ¼ cup lemon juice
- 1 teaspoon salt
- 1 clove garlic, crushed
- Dash paprika
- 1 cup crushed potato chips
- ½ cup crushed saltines
- Lemon wedges

Thaw frozen steaks. Cut into serving-size portions and place in a shallow baking dish. Combine butter, lemon juice, salt, garlic, and paprika. Pour sauce over fish and let stand for 30 minutes, turning once. Combine crushed chips and saltines. Remove fish, reserving sauce for basting. Roll fish in crumb mixture. Place fish on a well-greased broiler pan. Drizzle sauce over fish. Broil about 5 inches from source of heat for 4 to 6 minutes or until brown. Turn carefully and broil 4 to 6 minutes longer or until brown and fish flakes easily when tested with a fork. Serve with lemon wedges. Serves 6.

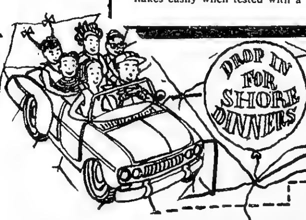
CLAM BAKE

Boston for Beans and—

LYONNAISE HADDOCK

- 2 pounds haddock fillets or other fish fillets, fresh or frozen
- 4 cups thinly sliced onion
- ¼ cup butter or margarine, melted
- 2 tablespoons lemon juice
- 1 teaspoon salt
- ⅛ teaspoon pepper
- 2 tablespoons chopped parsley
- 1 teaspoon crushed dill weed

Thaw frozen fillets. Skin fillets and cut into serving-size portions. Cook onion in butter until lightly browned. Place ⅓ of onion on bottom of a well-greased baking dish, 12 x 8 x 2 inches. Arrange fish over onion. Sprinkle with lemon juice, salt, and pepper. Add parsley and dill weed to remaining onion; spread over fish. Bake in a moderate oven, 350° F., for 30 to 40 minutes or until fish flakes easily when tested with a fork. Serves 6.



Appetites Ahoy!

Wherever You Go in the U.S.A. There are Seafoods to Delight Any Gourmet.

It's Mighty Good in Mobile

OYSTER SANDWICH LOAVES

- 2 cans (12 ounces each) shucked oysters, fresh or frozen
- 6 rectangular Italian rolls
- ¼ cup soft butter or margarine
- 1½ cups dry bread crumbs
- 1½ cups flour
- 2 eggs, beaten
- 2 tablespoons milk
- 1 teaspoon salt
- Dash pepper
- Cocktail Sauce

Thaw frozen oysters. Drain oysters. Slice off top of each roll. Scoop out the inside to form a basket, leaving about ½ inch of crust all around. Spread inside and tops with butter. Place on a cooky sheet, 15 x 12 inches. Toast under broiler, about 5 inches from source of heat, for 2 to 3 minutes or until golden brown. Combine crumbs and flour. Combine egg, milk, and seasonings. Roll oysters in crumb mixture, dip in egg mixture, and roll in crumb mixture. Fry in hot fat at moderate heat until brown on one side. Turn carefully and brown the other side. Cooking time approximately 5 to 7 minutes. Drain on absorbent paper. Place oysters in toasted rolls. Cover with tops of rolls. Heat in a hot oven, 400° F., for 5 minutes. Serve with Cocktail Sauce. Serves 6.

A Smile a Mile ~~~ ~~~ With Seafoods!

From Special Fisheries Marketing Bulletin: "A Seafood Tour of the U. S. A.," U. S. Bureau of Commercial Fisheries.

Gulf of Mexico